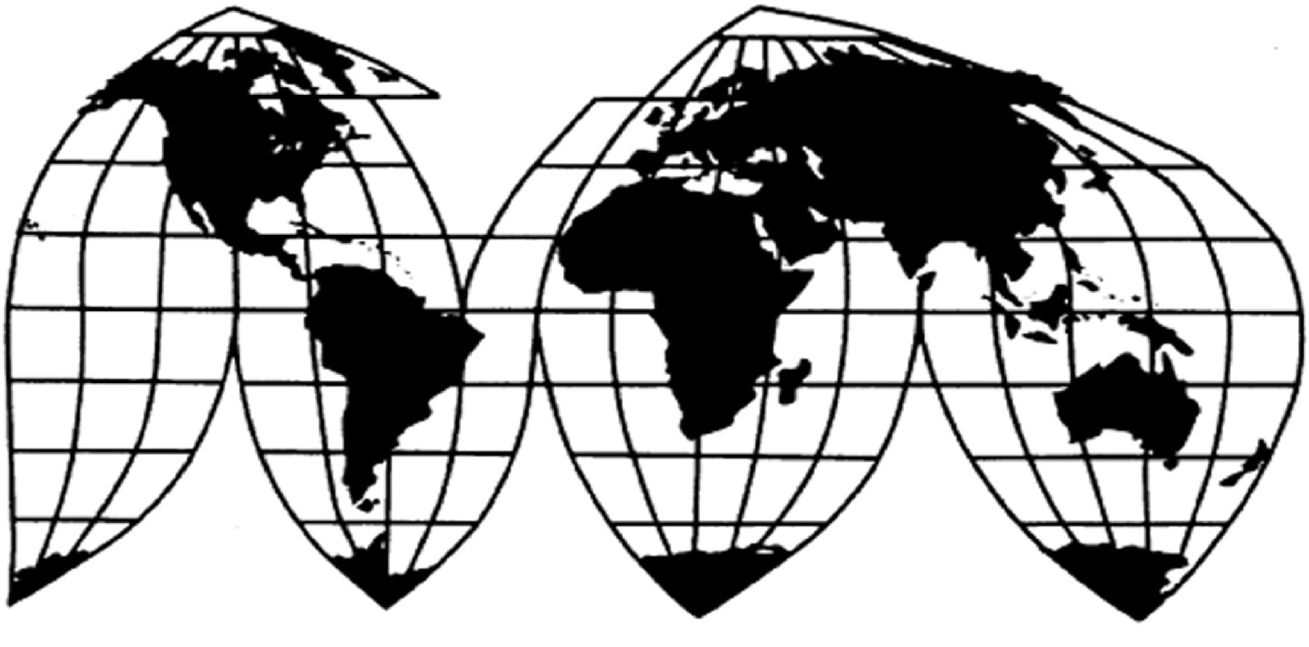
In the Matter of

Certain Rubber Antidegradants, Components Thereof, and Products Containing Same

Investigation No. 337-TA-533

Publication 3975 **April 2008**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

COMMISSIONERS

Daniel R. Pearson, Chairman
Shara L. Aranoff, Vice Chairman
Deanna Tanner Okun
Charlotte R. Lane
Irving A. Williamson*
Dean A. Pinkert*

---

*Commissioner Irving A. Williamson was sworn in on February 7, 2007, and Commissioner Dean A. Pinkert was sworn in on February 26, 2007; they did not participate in this investigation. Commissioner Stephen Koplan, whose term ended on February 6, 2007, and Commissioner Jennifer A. Hillman, whose term ended on February 23, 2007, did participate in this investigation.

Address all communications to
Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

U.S. International Trade Commission

Washington, DC 20436
www.usitc.gov

In the Matter of

Certain Rubber Antidegradants, Components Thereof, and Products Containing Same

Investigation No. 337-TA-533

Publication 3975 **April 2008**

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of **CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME**	)	**Inv. No. 337-TA-533**

FINAL COMMISSION DETERMINATION REGARDING VIOLATION; ISSUANCE OF LIMITED EXCLUSION ORDER; TERMINATION OF INVESTIGATION

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to terminate the above-captioned investigation with a finding of violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("section 337") by two respondents and issuance of a limited exclusion order.

FOR FURTHER INFORMATION CONTACT: Wayne Herrington, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3090. Copies of the public version of the Commission's opinion and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone 202-205-2000. General information concerning the Commission may also be obtained by accessing its Internet server (*http://www.usitc.gov*). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://www.usitc.gov/secretary/edis.htm*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this section 337 investigation on March 29, 2005, based on a complaint filed by Flexsys America LP ("Flexsys"). 70 *Fed. Reg.* 15885 (March 29, 2005). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain rubber antidegradants, components thereof, and products containing same that infringe claims 30 and 61 of U.S. Patent No. 5,117,063 ("the '063 patent"), claims 7 and 11 of U.S. Patent No. 5,608,111 ("the '111 patent"), and claims 1, 32, and 40 of U.S. Patent No. 6,140,538 ("the '538 patent"). The complaint and notice of investigation named five respondents. The investigation was subsequently terminated as to two respondents and as to the '538 patent.

On February 17, 2006, the ALJ issued his final ID finding a violation of section 337 by respondents Sinorgchem Co., Shandong, ("Sinorgchem") and Sovereign Chemical Company ("Sovereign"), but finding no violation of section 337 by respondent Korea Kumho Petrochemical Co., Ltd. ("KKPC"). The ALJ recommended that the Commission issue limited exclusion orders, but did not recommend that any bond be imposed for importations during the Presidential review period. All parties petitioned for review of various parts of the final ID.

On April 13, 2006, the Commission issued notice that it had determined to review the final ID in its entirety and received review submissions from all the parties, including submissions on remedy, public interest, and bonding. The Commission also received submissions from three non-parties. Respondent KKPC moved to strike these three submissions as well as Attachment 1 to Flexsys' initial review submission. KKPC also moved for leave to file a reply to Flexsys' response to its motion to strike.

Having examined the relevant portions of the record in this investigation, including the ALJ's initial and recommended determinations, the written submissions on the issues on review and on remedy, public interest, and bonding, and the replies thereto, the Commission determined (1) that there is a violation of section 337 by Sinorgchem and Sovereign, but no violation by KKPC; (2) to not reach the licensing and estoppel defenses raised by KKPC; (3) that the appropriate remedy for the violation by Sinorgchem and Sovereign is a limited exclusion order; and (4) to deny as moot KKPC's motion to strike and its motion for leave to file a reply.

The Commission also determined that the public interest factors enumerated in section 337(d) do not preclude the issuance of the aforementioned remedial order and that no bond should be set for importation during the Presidential review period. The Commission's remedial order was delivered to the United States Trade Representative on the date of its issuance.

This action is taken under the authority of section 337 of the Tariff Act of 1930, 19 U.S.C. § 1337, the Administrative Procedure Act, and sections 210.41-51 of the Commission's Rules of Practice and Procedure, 19 C.F.R. §§ 210.41-51.

By order of the Commission.

Marilyn R. Abbott
Secretary to the Commission

Issued: July 13, 2006

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of

CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME

Inv. No. 337-TA-533

LIMITED EXCLUSION ORDER

Having reviewed the record in this investigation, including the submissions of the parties, the Commission has determined that there is a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the unlawful importation, sale for importation and/or sale after importation of N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, also known as "6PPD," (1) by respondent Sinorgchem Co., Shandong ("Sinorgchem") by reason of infringement of claims 30 or 61 of U.S. Patent No. 5,117,063 ("the '063 patent"), or claims 7 or 11 of U.S. Patent No. 5,608,111 ("the '111 patent") and (2) by respondent Sovereign Chemical Company ("Sovereign") by reason of infringement of claim 61 of the '063 patent or claim 11 of the '111 patent. The Commission has also determined that the appropriate form of relief is a limited exclusion order, that the public interest factors enumerated in 19 U.S.C. § 1337(d) do not preclude issuance of the limited exclusion order, and that there should not be a bond during the Presidential review period.

Accordingly, the Commission hereby **ORDERS** that:

1. N-phenyl-p-phenylenediamine, also known as "4-aminodiphenylamine," "4-ADPA," or "PADA," made by a process covered by claim 30 of U.S. Patent No. 5,117,063 or claim 7 of U.S. Patent No. 5,608,111 that is manufactured abroad and/or imported by or on behalf of Sinorgchem, or any of its affiliated companies, parents, subsidiaries, or other related business entities, or its successors or assigns, is excluded from entry for consumption into the United States, entry for consumption from a foreign-trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patent, except under license of the patent owner or as provided by law.

2. N-(l,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, also known as "6PPD," that is made by a process covered by claim 61 of U.S. Patent No. 5,117,063 or claim 11 of U.S. Patent No. 5,608,111 that is manufactured abroad and/or imported by or on behalf of Sinorgchem or Sovereign, or any of their affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns, are excluded from entry for consumption into the United States, entry for consumption from a foreign-trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patent, except under license of the patent owner or as provided by law.

3. Products that are excluded by paragraphs 1 or 2 of this Order are entitled to entry for consumption into the United States, entry for consumption from a foreign-trade zone, or withdrawal from a warehouse for consumption,

without bond from the day after this Order is received by the United States Trade Representative as delegated by the President, 70 *Fed. Reg.* 43251 (July 21, 2005), and until such time as the United States Trade Representative notifies the Commission that this action is approved or disapproved but, in any event, not later than sixty (60) days after the date of receipt of this action.

4. When U.S. Customs and Border Protection ("Customs") is unable to determine by inspection whether N-phenyl-p-phenylenediamine, also known as "4-aminodiphenylamine," "4-ADPA," or "PADA" or N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, also known as "6PPD," falls within the scope of this Order, it may, in its discretion, accept a certification, pursuant to procedures specified and deemed necessary by Customs, from persons seeking to import said products that they are familiar with the terms of this Order, that they have made appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry under paragraphs 1 or 2 of this Order. At its discretion, Customs may require persons who have provided the certification described in this paragraph to furnish such records or analyses as are necessary to substantiate the certification.

5. In accordance with 19 U.S.C. § 1337(l), the provisions of this Order shall not apply to N-phenyl-p-phenylenediamine, also known as "4-aminodiphenylamine," "4-ADPA," or "PADA," or N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, also known as "6PPD,"

that is imported by and for the use of the United States, or imported for, and to be used for, the United States with the authorization or consent of the Government.

6. KKPC's motion to strike the three non-party submissions received on review and to strike Attachment 1 of complainant's initial review submission is denied as moot. KKPC's motion for leave to file a reply to complainant's response to its motion to strike is denied as moot.

7. The Commission may modify this Order in accordance with the procedures described in Rule 210.76 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.76.

8. The Secretary shall serve copies of this Order upon each party of record in this investigation and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and U.S. Customs and Border Protection.

9. Notice of this Order shall be published in the *Federal Register*.

By Order of the Commission.

Marilyn R. Abbott
Secretary to the Commission

Issued: July 13, 2006

CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME **337-TA-533**

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **NOTICE OF COMMISSION DETERMINATION REGARDING VIOLATION; ISSUANCE OF LIMITED EXCLUSION ORDER; TERMINATION OF INVESTIGATION** has been served on upon all parties and Commission Investigative Attorney, Juan Cockburn, Esq. via first class mail and air mail where necessary on July 13, 2006.

Marilyn R. Abbott

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

COUNSEL FOR COMPLAINANT FLEXSYS AMERICA L.P.:

Gregory C. Dorris, Esq.
Charles H. Carpenter, Esq.
PEPPER HAMILTON LLP
Hamilton Square
600 14th Street, NW
Washington, DC 20005-2004

Eric C. Cohen, Esq.
Charles R. Krikorian, Esq.
KATTEN MUCHIN ZAVIS ROSENMAN
525 West Madison
Chicago, IL 60661-3693

Gary Ropski, Esq.
Chikiu Chan, Esq.
BRINKS HOFER GILSON & LIONE
NBC Tower
455 North Cityfront Plaza
Suite 3600
Chicago, Illinois 60611

ON BEHALF OF RESPONDENT KOREA KUMHO PETROCHEMICAL CO., LTD.:

Guy W. Chambers, Esq.
Maureen Sheehy, Esq.
TOWNSEND TOWNSEND & CREW
Two Embarcadero Center
Eighth Floor
San Francisco, CA 94111

V. James Adduci II, Esq.
Barbara A. Murphy, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, LLP
1200 17th Street, NW
Washington, DC 20036

Robert G. Badal, Esq.
Edward J. Slizewski, Esq.
HELLER EHRMAN LLP
333 S. Hope Street
Suite 3900
Los Angelos, CA 90071-3043

Alan H. Blankenheimer, Esq.
HELLER EHRMAN LLP
4350 La Jolla Village Drive – 7th Floor
San Diego, California 92122

ON BEHALF OF SOVEREIGN CHEMICAL CO.:

James K. Kearney, Esq.
WOMBLE, CARLYLE SANDRIDGE & RICE LLP
1401 I Street, NW, 7th Floor
Washington, DC 20005

Nanda K. Alapati, Esq.
WOMBLE, CARLYLE SANDRIDGE & RICE LLP
8065 Leesburg Pike, 4th Fl.
Tysons Corner, VA 22182-2738

Scott M. Oldham, Esq.
HAHN LOESER & PARKS LLP
One GOJO Plaza, Suite 300
501 S Main Street
Akron, OH 044311-1076

Deborah A. Coleman, Esq.
HAHN LOESER & PARKS LLP
3300 BP Tower
200 Public Square
Cleveland, OH 44114

ON BEHALF OF SINORGCHEM CO., LTD.:

Paul J. Zegger, Esq.
ARNOLD & PORTER LLP
555 12th Street, NW
Washington, DC 20004

Shanlon Wu
KING AND WOOD PRC Lawyers
31st Fl., Tower A. Jianwei SOHO,
39 Dongsanhuan Zhonglu
Chaoyang District, Beijing 100022
People's Republic of China

Manni Li, Esq.
VENABLE LLP
575 7th Street, NW
Washington, DC 20004

Marcia H. Sundeen, Esq.
KENYON & KENYON
1500 K Street, NW
Washington, DC 20005

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME**	)	**Inv. No. 337-TA-533**

COMMISSION OPINION

On July 12, 2006, the Commission issued notice that it had determined to terminate the above-captioned investigation with a finding that that there is a violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("section 337") by respondents Sinorgchem Co., Shandong, and Sovereign Chemical Company. The Commission found no violation of section 337 by respondent Korea Kumho Petrochemical Co., Ltd. The Commission denied as moot that respondent's motion to strike certain submissions by three non-parties and to strike Attachment 1 of the initial review submission filed by complainant Flexsys America LP.

The Commission determined that the appropriate remedy for the violation of section 337 it found is a limited exclusion order, that the public interest factors set out in section 337(d) do not preclude the issuance of such an order, and that no bond should be set for importation during the Presidential review period.

This opinion sets forth the reasons for the Commission's final determination.

I. INTRODUCTION

The Commission instituted this section 337 investigation on March 29, 2005, based on a complaint filed by Flexsys America LP ("Flexsys") of Akron, Ohio. 70 *Fed. Reg.* 15885 (March 29, 2005). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain rubber antidegradants, components thereof, and products containing same by reason of infringement of claims 30 and 61 of U.S. Patent No. 5,117,063 ("the '063 patent"); claims 7 and 11 of U.S. Patent No. 5,608,111 ("the '111 patent"); and claims 1, 32, and 40 of U.S. Patent No. 6,140,538 ("the '538 patent"). The investigation was assigned to administrative law judge ("ALJ") Paul J. Luckern.

The complaint and notice of investigation named five respondents: Sinorgchem Co., Shandong ("Sinorgchem"); Korea Kumho Petrochemical Co., Ltd. ("KKPC"); Sovereign Chemical Company ("Sovereign"); Vilax Corporation ("Vilax"); and Stolt-Nielsen Transportation Group Ltd. ("SNTG"). The investigation has previously been terminated as to respondents Vilax and SNTG and as to the '538 patent.

On February 17, 2006, the ALJ issued his final initial determination ("final ID") finding that Sinorgchem and Sovereign had violated section 337, but that KKPC had not. He recommended that the Commission issue limited exclusion orders against products of Sinorgchem and Sovereign made by the processes covered by the asserted claims, but did not recommend that any bond be imposed for importation during the Presidential review period. All parties, including the Commission investigative attorney ("IA"), filed petitions for review of various parts of the final ID.

On April 13, 2006, the Commission issued notice that it had determined to review the final ID in its entirety.[1] The Commission provided for briefing on the issues under review, as well as the questions of remedy, public interest, and bonding. With respect to the issues under review, the Commission requested briefing based on the evidentiary record, noting that while it had determined to review the final ID in its entirety, it was particularly interested in briefing on the issues of claim construction and indefiniteness, especially with respect to the term "controlled amount of protic material," which appears in all the asserted claims. In addressing the question of claim construction, the Commission stated that each party should specifically identify those portions of the claim language, specification, and prosecution history (and other evidence, if appropriate) which support the construction it advocates. The Commission also requested the parties to respond to following questions:

> 1. With respect to the ID's construction of the term "controlled amount of protic material," what is the basis for including "the desired selectivity," given that col. 4, ll. 48-50 ('063 patent) states: "A 'controlled amount' of protic material is an amount up to that which inhibits the reaction of aniline with nitrobenzene...," a statement which does not contain the term "selectivity"?
>
> 2. Given that the '111 patent is based on a continuation-in-part application, what is the legal basis for using matter in the claims and specification of that patent not common to the disclosure of the '063 patent to construe the claims of the '063

---

[1] The Commission's review included the issue of whether the ALJ properly determined that the issue of infringement by the P1 and P2 processes of KKPC was not before him, but that review was only for the purpose of making a correction to the final ID, *i.e.*, to substitute "Motion No. 533-61" for "Motion No. 533-57" on page 96 of the final ID, a correction the Commission made in its review notice. The Commission otherwise concluded that the ALJ was correct in his determination on this issue.

patent? What is the legal basis for using the prosecution history of the '111 patent to construe the claims of the '063 patent?

3. Referring to the ALJ's definition of "controlled amount of protic material" in the ID at 78-79, what is the meaning of the terms "inhibited" and "desired selectivity"? How are these terms applied to determine infringement by the accused processes? With respect to the claim construction of "controlled amount of protic material" adopted in the ID, what is the evidence that the claims, specification, and prosecution history would provide a person of ordinary skill in the art with knowledge of what constitutes "inhibition" and the "desired selectivity"?

4. With respect to the licensing issues raised by Korea Kumho Petrochemical Co., Ltd., which are stated to be subject to Korean law, state the applicable Korean law and discuss how it applies.

5. With respect to the estoppel issue raised by Korea Kumho Petrochemical Co., Ltd., state what law (Korean, U.S., or other) applies and how it applies.

All parties filed initial and reply briefs on the merits and on remedy, the public interest, and bonding. The Commission also received written submissions from former Senator Dennis DeConcini, Professor John R. Thomas of the Georgetown University Law Center, and Theodore R. Olsen of the law firm of Gibson, Dunn & Crutcher, all dealing with the application of 35 U.S.C. § 271(g). KKPC has moved to strike these three submissions as well as Appendix 1 of Flexsys' Brief on Review, which consists of synopses of Korean court decisions. KKPC's motion is supported by the IA, but opposed by Flexsys. KKPC has filed a motion for leave to reply to Flexsys' response.

On May 11, 2006, the Commission issued notice that it had determined to extend the target date for completion of this investigation to July 12, 2006.

II. STANDARD ON REVIEW

The Commission's determination on review of an ID is governed by Commission rule 210.45(c) (19 C.F.R. § 210.45(c)). Upon review of an ID, the Commission "examines for itself the record on the issues under review." *Certain Acid-Washed Denim Garments*, Inv. No. 337-TA-324 (USITC Pub. 2576 (Nov. 1992)). The Commission may affirm, reverse, or modify the ID in whole or in part. 19 C.F.R. § 210.45(c). It may also set aside or remand the ID in whole or in part. *Id.* In doing so, it may make any findings or conclusions that are in its view proper based on the record in the proceeding. *Id.*

III. THE IMPORTED PRODUCT AND THE ASSERTED PATENTS

The imported product is a compound known as 6PPD, which is used as a rubber antidegradant. It is made from an intermediate compound, 4-aminodiphenylamine, also known as 4-ADPA. Sinorgchem makes 6PPD in China from 4-ADPA which it also makes in China or purchases from third parties. Sinorgchem sells the 6PPD it makes to Sovereign for importation into the United States. KKPC makes 6PPD in South Korea from 4-ADPA purchased from third parties (including Sinorgchem) and has sold 6PPD for importation into the United States.

The '063 patent covers a process for making 4-ADPA and a process for using 4-ADPA to make p-phenylenediamines, including 6PPD. The '111 patent covers a process for making 4-ADPA or substituted derivatives thereof and for using those products to make p-phenylenediamines, including 6PPD. Copies of both patents are attached to this opinion.

A. The '063 Patent

The '063 patent is entitled "Method of Preparing 4-Aminodiphenylamine." It issued on

May 26, 1992, based on application No. 719,876, filed on June 21, 1991. The named inventors are Michael K. Stern and James K. Bashkin. As issued, the patent was assigned to Monsanto Company; it was subsequently assigned to Flexsys. The '063 patent has 94 claims, of which claims 30 and 61 are asserted in this investigation.

Claim 30 is a method claim. It covers:

> A method of producing 4-aminodiphenylamine (4-ADPA) comprising the steps of:
>
> a) bringing aniline and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates; and
>
> c) reducing the 4-ADPA intermediates under conditions which produce 4-ADPA.

Claim 61 is a method claim for producing alkylated p-phenylenediamines (including 6PPD) by reductive alklyation of the 4-ADPA produced by the method of claim 30. Claim 61 covers:

> A method of producing alkylated p-phenylenediamines comprising the steps of:
>
> a) bringing aniline and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates;
>
> c) reducing the 4-ADPA intermediates under conditions which produce 4-ADPA; and
>
> d) reductively alklylating the 4-ADPA of Step c).

The first three steps of claim 61 are identical to the steps of claim 30.

B. The '111 Patent

The '111 patent is also entitled "Method of Preparing 4-Aminodiphenylamine." It issued on March 4, 1997, based on application No. 435,607, filed May 5, 1995. That application was in turn a continuation of application No. 157,120 ('the '120 application"), filed as a U.S-origin PCT (Patent Cooperation Treaty) application (PCT/US92/0232) on March 25, 1992, and which resulted in U.S. Patent No. 5,453,541. The '120 application was a continuation-in-part of application No. 719,876, filed June 21, 1991, which, as noted above, resulted in the issuance of the '063 patent. The named inventors are Michael K. Stern, James M. Allman, James K. Baskin, and Roger K. Rains. Stern and Baskin are also the two inventors on the '063 patent. The patent is assigned on its face to Flexsys. A notation on the '111 patent states that its term shall not extend beyond the expiration date of the '063 patent. This was the result of a terminal disclaimer filed during prosecution of the '111 patent to overcome an obviousness-type double patenting rejection.

The '111 patent has 31 claims; the asserted claims are claims 7 and 11.

Claim 7 covers a method for producing 4-ADPA or substituted derivatives thereof, as follows:

> A method of producing 4-aminodiphenylamine (4-ADPA) or substituted derivatives thereof comprising:
>
> a) bringing aniline or substituted aniline derivatives and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline or substituted aniline derivatives and nitrobenzene in a

> confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates; and
>
> c) reducing the 4-ADPA intermediates under conditions which produce 4-ADPA or substituted derivatives thereof wherein the amount of protic material in step (b) is controlled by continuous distillation of said protic material.

Claim 7 of the '111 patent differs from claim 30 of the '063 patent by providing that substituted aniline derivatives may be reactants, that reduction of the 4-ADPA intermediates may produce substituted derivatives of 4-ADPA, and that the amount of protic material is controlled by continuous distillation of that material.

Claim 11 of the '111 patent covers a method for producing alkylated p-phenylenediamines or substituted derivatives thereof (including 6PPD), as follows:

> A method of producing alkylated p-phenylenediamines or substituted derivatives thereof comprising the steps of:
>
> a) bringing aniline or substituted aniline derivatives and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline or substituted aniline derivatives and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates;
>
> c) reducing the 4-ADPA intermediates to produce 4-ADPA or substituted derivatives thereof; and
>
> d) reductively alklylating the 4-ADPA or substituted derivatives thereof of step (c) wherein the amount of protic material in step (b) is controlled by the continuous distillation of said protic material.

IV. SUMMARY OF THE ALJ'S INITIAL DETERMINATION

In his final ID, the ALJ construed the asserted claims, adopting the construction advanced by Flexsys, rejecting that advanced by respondents and the IA, and also rejecting arguments by respondents and the IA that the construction advanced by Flexsys would render the asserted claims indefinite. ID 35-93, 114-119.

Based on his claim construction, the ALJ found that Sinorgchem infringed[2] all the asserted claims and that Sovereign, via its importation and sale of 6PPD made by Sinorgchem, infringed "at least method claim 61 of the '063 patent and method claim 11 of the '111 patent." ID 97-102. However, he found that respondent KKPC, which makes 6PPD from 4-ADPA purchased from third parties (including Sinorgchem), did not infringe since it does not itself perform all the steps of the asserted claims. ID 102-105.

The ALJ rejected KKPC's effort to have him determine the issue of whether its newly-developed P1 and P2 processes were infringing, finding that that issue was not before him. ID 96-97. He also rejected KKPC's argument that it was licensed or that its activities were permissible under principles of estoppel. ID 122-130.

Based on his claim construction, the ALJ rejected the arguments of respondents that the asserted claims were invalid for obviousness and also found that Flexsys had met the technical prong of the domestic industry requirement. ID 105-114, 119-122. He noted that in an earlier, non-final ID, he had found that Flexsys met the economic prong of the domestic industry requirement and that the Commission had determined not to review that ID, making it the final determination of the Commission on that issue. ID 120.

---

[2] We understand the term "infringe" in this investigation as referring to a violation of section 337(a)(1)(B)(ii).

Finally, he recommended the issuance of limited exclusion orders against products of Sinorgchem and Sovereign made by the claimed processes, but did not recommend that any bond be required for importation during the Presidential review period. ID 130-134.

V. ISSUES PRESENTED: ANALYSIS AND DETERMINATION

A. Claim Construction; Indefiniteness

1. Applicable Law

A patent has two basic components: (1) the specification, which is a written description of the invention and the manner of making and using it; and (2) the claim(s), which particularly point out and distinctly claim the subject matter that the patent applicant regards as his invention.[3] 35 U.S.C. § 112, ¶¶ 1, 2. The claims of the patent measure the right to exclude. *See, e.g.*, *Johnson & Johnston Assocs. Inc. v. R.E. Service Co., Inc.*, 285 F.3d 1046, 1052 (Fed. Cir. 2002) (en banc).

The first step in determining whether a patent claim is *infringed* (as well as in determining its validity) is to interpret the scope and meaning of the claim language. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc), *aff'd* 517 U.S. 370 (1996). This interpretive step, referred to as *claim construction*, requires an analysis of the *intrinsic evidence* of record, which consists of the claims, the specification, and (if in evidence) the prosecution history of the patent before the PTO. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1311-1318 (Fed. Cir. 2005) (en banc); *Markman*, 52 F.3d 967, 979-980. Evidence which lies

---

[3] Strictly speaking, the claims are part of the specification, but they are generally discussed as being separate. *See In re Dossel*, 115 F.3d 942, 944-46 (Fed. Cir. 1997).

outside the definition of intrinsic evidence is referred to as extrinsic evidence. Such evidence may be used for the court's understanding of the patent, but not to vary or contradict the terms of the claims. *Phillips*, 415 F.3d 1303, 1317-1319; *Markman*, 52 F.3d 967, 981.

Claim terms are given the ordinary meaning that would be attributed to them by persons skilled in the relevant art. *Phillips*, 415 F.3d 1303, 1312-1313; *Honeywell International, Inc. v. International Trade Commission*, 341 F.3d 1332, 1338 (Fed. Cir. 2003). A patentee may choose to define a term in a special way. *Phillips*, 415 F.3d 1303, 1316; *Markman*, 52 F.3d 967, 969. However, his intent to do so must be clear, either expressly or by implication, on the face of the specification. *Markman*, 52 F.3d 967, 979; *Vitronics Corporation v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Claim construction is a question of law. *Markman*, 52 F.3d 967, 979.

Closely allied to claim construction is the requirement for claim definiteness set out in the second paragraph of 35 U.S.C. § 112, which provides:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims are not indefinite simply because they are difficult to construe, but if a claim cannot be construed, it is indefinite and, as a consequence, invalid. *Honeywell*, 341 F.3d 1332, 1338-39. In determining whether a claim is definite, the tribunal must analyze whether "one skilled in the art would understand the bounds of the claim when read in light of the specification." *Personalized Media Communications, LLC v. International Trade Commission*, 161 F.3d 696, 705 (Fed. Cir. 1998). Like claim construction, indefiniteness is a question of law.

Id.

If claims are invalid for indefiniteness, by definition they cannot be construed, and any issue which depends on the claims being construed, such as infringement, cannot be addressed. *See, Honeywell*, 341 F.3d 1332, 1342 (Commission's determination of claim indefiniteness affirmed, but determination of infringement vacated).

2. The ALJ's Initial Determination

The issues of claim construction and indefiniteness are centered on the claim term "controlled amount of protic material," which occurs in all the asserted claims.

The ALJ considered the construction of the claim term "controlled amount of protic material" at ID 43-93, having earlier stated that the claims must be construed as they would be by one of ordinary skill in the art.[4] He found that the term means:

> the amount of protic material (which is not limited to water) should be controlled between (1) an upper limit of protic material which is the amount of protic material beyond which the reaction between nitrobenzene and aniline (or substituted aniline) is inhibited and (2) a lower limit of protic material which is the amount of protic material below which the desired selectivity for 4-ADPA intermediates is not maintained.

ID 78-79.

---

[4] The ALJ addressed the issue of who is a person of ordinary skill in the relevant art at ID 37-38. He found that all parties are in agreement that a person of ordinary skill in the art in the field of the '063 and '111 patents in 1990 "would have a masters degree or equivalent." ID 37. He found that in view of the technology in issue, that such a person should have at least a masters degree in organic chemistry and some experience in the art of making 4-ADPA in view of the "Related Art" sections set forth in the '063 and '111 patents. ID 37. He also found that the person of ordinary skill in the art is a hypothetical person who is presumed to be aware of all pertinent prior art. ID 37-38.

The ALJ rejected the arguments of respondents and the IA that, in the specifications of the patents, the patentees had defined "controlled amount of protic material" to mean that when aniline is the solvent and water is the protic material, the amount of water must be less than about 4% by volume of the reaction mixture.[5]

The ALJ also addressed the claim term "suitable solvent system" and found that it was undisputed that "a suitable solvent system permits nitrobenzene and aniline to be brought into reactive content [sic, contact]." ID 93

The ALJ rejected the arguments of respondents and the IA that Flexsys' proposed claim construction (which he adopted) would render the claims indefinite as not being amenable to assessment by an objective standard. ID 114-119.

3. Analysis and Determination

a. Claim Construction: the ALJ's Use of the Specification and Prosecution History of the '111 patent to Construe the Claims of Both Patents

As a preliminary matter, we address the question of the ALJ's use of the specification and prosecution history of the '111 patent to construe the claims of both the '063 patent and the '111 patent. The question arises because, as mentioned above, the '111 patent is based on a continuation-in-part application and thus contains disclosure that the '063 patent does not.[6]

---

[5] The IA further specified that when TMAH (tetramethylammonium hydroxide) is the base, the upper limit must be less than 4% water (as opposed to less than "about" 4% water). ID 44.

[6] A continuation-in-part application contains the same disclosure as a previous application, but also adds some new matter not present in the disclosure of the original application. Claims in a continuation-in-part application which are supported by the disclosure of the original application obtain the benefit of the filing date of the original application.

The ALJ stated that all the parties had argued that the disputed claim term, "controlled amount of protic material," should be construed to mean the same thing in the claims of both the '063 patent and the '111 patent. ID 44. In arriving at his conclusion on claim construction and that the asserted claims were definite, the ALJ relied on the disclosure of the '111 patent, including claim 29 and examples 13 and 15 thereof, as well as its prosecution history, apparently relying on *Omega Engineering, Inc. v. Raytek Corp.*, 334 F.3d 1314 (Fed. Cir. 2003), for the proposition that the '111 (CIP) patent and its prosecution history could be relied on in their entirety to construe the claims of the '063 patent. ID 79 n. 24. In its petition for review, Sinorgchem argued that the ALJ erred in relying on *Omega*, correctly stating that in that case the Court relied on an *ancestor* patent to construe the claims of a subsequent CIP patent, not the other way around. As part of its review of the ID, the Commission asked the parties to respond to the following question:

> 2. Given that the '111 patent is based on a continuation-in-part application, what is the legal basis for using matter in the claims and specification of that patent not common to the disclosure of the '063 patent to construe the claims of the '063 patent? What is the legal basis for using the prosecution history of the '111 patent to construe the claims of the '063 patent?

In its response to Question 2, Flexsys does not rely on *Omega Engineering*, but on three other cases: *Microsoft Corp. v. Multi-Tech Systems, Inc.*, 357 F.3d 1340 (Fed. Cir. 2004),

---

However, claims in a continuation-in-part application which must rely for support on the additional disclosure in the continuation-in-part application are only entitled to the filing date of the continuation-in-part application, not the filing date of the original application. The difference in filing dates means that there may be art which is prior art as to claims which require the additional disclosure for support but which is not prior art as to claims supported by the original disclosure.

Goldenberg v. Cytogen, Inc., 373 F.3d 1158 (Fed Cir. 2004), and *Abbott Labs. v. Dey L.P.*, 287 F.3d 1097 (Fed. Cir. 2002). None of these cases support Flexsys' argument since none of them approved the use of the additional matter in a continuation-in-part specification to construe the claims of an ancestor application. Indeed, two of the cases did not involve a continuation-in-part application at all. Thus, Flexsys has provided no authority for the proposition that the additional disclosure of a CIP application, at least to the extent it constitutes the new matter, may be used to construe the claims of an ancestor application. In our view, such use would effectively treat the new matter in a CIP application as if it were present in the ancestor application, a contradiction of the very definition of a CIP application. We have avoided relying on the new matter in the '111 patent in addressing claim construction and indefiniteness. Indeed, as discussed below, our disposition of this case does not (and need not) rely on the additional disclosure or prosecution history of the '111 patent.

b. Claim Construction: Whether the "Controlled Amount of Protic Material" Can Include "Desired Selectivity"

As noted above, the ALJ found that the disputed term "controlled amount of protic material" means:

> the amount of protic material (which is not limited to water) should be controlled between (1) an upper limit of protic material which is the amount of protic material beyond which the reaction between nitrobenzene and aniline (or substituted aniline) is *inhibited* and (2) a lower limit of protic material which is the amount of protic material below which the *desired selectivity* for 4-ADPA intermediates is not maintained.

ID 78-79 (emphasis supplied).

The term is referred to in the so-called PARAGRAPH which appears in the specification:

> Control of the amount of protic material present in the reaction is important. Generally, when the reaction is conducted in aniline, water present in the reaction in an amount greater than about 4% H_2O (based on volume of the reaction mixture) inhibits the reaction of the aniline with the nitrobenzene to an extent where the reaction is no longer significant. Reducing the amount of water to below the 4% level causes the reaction to proceed in an acceptable manner. When tetramethylammonium hydroxide is utilized as a base with aniline as the solvent, as the amount of water is reduced further, e.g., down to about 0.5% based on the volume of the reaction mixture, the total amount of 4-nitrodiphenylamine and 4-nitrosodiphenylamine increases with some loss in selectivity so that more 2-nitrodiphenylamine is produced but still in minor amounts. Thus, the present reaction could be conducted under anhydrous conditions. *A "controlled amount" of protic material is an amount up to that which inhibits the reaction of aniline with nitrobenzene, e.g., up to about 4%* H_2O *based on the volume of the reaction mixture when aniline is utilized as the solvent.* The upper limit for the amount of protic material present in the reaction varies with the solvent. For example, when DMSO is utilized as the base, the upper limit on the amount of protic material present in the reaction is about 8% H_2O based on the volume of the reaction mixture. When aniline is utilized as the solvent with the same base, the upper limit is 4% H_2O based on the volume of the reaction mixture. In addition, the amount of protic material tolerated will vary with the type of base, amount of base, and base cation, used in the various solvent systems. However, it is within the skill of one in the art, utilizing the teachings of the present invention, to determine the specific upper limit of the amount of protic material for a specific solvent, type and amount of base, base cation and the like. The minimum amount of protic material necessary to maintain selectivity of the desired products will also depend on the solvent, type and amount of base, base cation and the like, that is utilized and can also be determined by one skilled in the art.

'063 Patent, Col. 4, l. 31-Col. 5, l.4 (emphasis supplied).

This emphasized language in the PARAGRAPH appears to be an express definition of "controlled amount of protic material," but one which defines that term only with respect to the upper limit of such material, which upper limit is itself defined as the level at which the aniline/nitrobenzene reaction is inhibited, without regard to the "desired selectivity" of the reaction. For that reason the Commission posed the following question to the parties:

> 1. With respect to the ID's construction of the term "controlled amount of protic material," what is the basis for including "the desired selectivity," given that col. 4, ll. 48-50 ('063 patent) states: "A 'controlled amount' of protic material is an amount up to that which inhibits the reaction of aniline with nitrobenzene...," a statement which does not contain the term "selectivity"?

Flexsys responded to that question by arguing that the term "controlled amount of protic material" should be construed to include "the desired selectivity" because the claims at issue require that the reaction take place "in the presence of ...[a] controlled amount of protic material" and "the same paragraph in the specification that recites the upper limit referred to in the Commission's question...informs one skilled in the art that a minimum amount of protic material is required in the reaction," specifically referring to the statement in the specification that "[t]he minimum amount of protic material necessary to maintain selectivity of the desired products will also depend on the solvent, type and amount of base, base cation and the like, that is utilized and can also be determined by one skilled in the art." Flexsys Brief on Review ("Flexsys Br.") 10-11, citing, *inter alia*, '063 patent, col. 4, l. 68-col. 5, l.4. Both respondents and the IA argue that there is no basis for construing the claim term to include "the desired selectivity," advancing several reasons in support of their arguments. Sinorgchem et al. Brief on Review ("Sinorgchem Br.") 1-9; IA Brief on Review ("IA Br.") 2-7.

In our view, there is no basis for construing the disputed term to include "the desired selectivity." The specification, including the PARAGRAPH, distinguishes between inhibition of the aniline/nitrobenzene reaction and the selectivity of that reaction. The patentees, acting as their own lexicographers, provided their own express definition of "controlled amount of protic material" in the specification. Only inhibition is included in their express definition of "controlled amount of protic material." That the PARAGRAPH also discusses the minimum amount of protic material necessary to obtain the "desired selectivity" of the reaction begs the question, since that discussion is not part of the express definition of "controlled amount of protic material" in the specification.

c. The Proposed Construction of Respondents and the IA

Respondents and the IA argue that the patentees acted as their own lexicographers, but in a different way from that referred to above. Thus, they maintain their argument that the ALJ erred in not finding that the patentees expressly defined "controlled amount of protic material" to mean that, when aniline is the solvent and water is the protic material, the amount of water must be less than about 4% by volume of the reaction mixture. Sinorgchem Br. 6-8; IA Br. 2-3, 16-17. Both respondents and the IA rely on statements in the PARAGRAPH which they argue provides a definition of the term "controlled amount of protic material" when aniline is the solvent and water is the protic material:

> Control of the amount of protic material present in the reaction is important. *Generally, when the reaction is conducted in aniline, water present in the reaction in an amount greater than about 4%* H_2O *(based on volume of the reaction mixture) inhibits the reaction of the aniline with the nitrobenzene to an extent where the reaction is no longer significant. Reducing the amount of water to below the 4% level causes the reaction to proceed in an acceptable manner.* When tetramethylammonium hydroxide is utilized as a base with aniline as the solvent, as the amount of water is reduced further, e.g., down to about 0.5% based on the volume of the reaction mixture, the total amount of 4-nitrodiphenylamine and 4-nitrosodiphenylamine increases with some loss in selectivity so that more 2-nitrodiphenylamine is produced but still in minor amounts. Thus, the present reaction could be conducted under anhydrous conditions. *A "controlled amount" of protic material is an amount up to that which inhibits the reaction of aniline with nitrobenzene, e.g., up to about 4%* H_2O *based on the volume of the reaction mixture when aniline is utilized as the solvent.* The upper limit for the amount of

> protic material present in the reaction varies with the solvent. For example, when DMSO is utilized as the base, the upper limit on the amount of protic material present in the reaction is about 8% H_2O based on the volume of the reaction mixture. *When aniline is utilized as the solvent with the same base, the upper limit is 4% H_2O based on the volume of the reaction mixture.* In addition, the amount of protic material tolerated will vary with the type of base, amount of base, and base cation, used in the various solvent systems. However, it is within the skill of one in the art, utilizing the teachings of the present invention, to determine the specific upper limit of the amount of protic material for a specific solvent, type and amount of base, base cation and the like. The minimum amount of protic material necessary to maintain selectivity of the desired products will also depend on the solvent, type and amount of base, base cation and the like, that is utilized and can also be determined by one skilled in the art.

'063 Patent, Col. 4, l. 31-Col. 5, l.4 (emphasis supplied).

The ALJ found that the claim term "controlled amount of protic material" is not generally used in chemistry and has no clear meaning to readers. ID 48. Nevertheless, he rejected the argument of respondents and the IA, finding that a person of ordinary skill in the art, considering the other language in the patents, including other language in the PARAGRAPH relied on by respondents and the IA, would not conclude that 4% would be the upper limit for protic material under all reaction conditions set forth in the patents. ID 91.

Flexsys argues that the ALJ's construction is correct, relying on Example 10 (which appears identically in the '063 and '111 patents) and Examples 13 and 15 (which appear only in the '111 patent), asserting that in these examples more than 10% water is present when aniline is used as the solvent. Flexsys Br. 18-19. Flexsys also argues that the doctrine of claim differentiation supports the ALJ's decision, noting that non-asserted claim 41 specifies "up to about 4% v/v water." Flexsys Br. 19-20.

Respondents and the IA essentially argue that where the protic material is water and the solvent is aniline, the upper limit of the protic material is about 4% by volume regardless of other reaction parameters and conditions. While the statements in the PARAGRAPH relied on by respondents and the IA can be read as supporting their argument, the PARAGRAPH contains other language which is inconsistent with their argument. Thus, the PARAGRAPH also states: "In addition, the amount of protic material tolerated will vary with the type of base, amount of base, and base cation, used in the various solvent systems. However, it is within the skill of one in the art, utilizing the teachings of the present invention, to determine the specific upper limit of the amount of protic material for a specific solvent, type and amount of base, base cation and the like." '063 patent, col. 4, ll. 61-68. This passage indicates that the upper limit depends on more than the solvent system and type of base. We also note that respondents do not dispute that the amount of water in Example 10, which appears identically in both the '063 and '111 patents, can be calculated and is about 10%, though they dispute the significance of that example. In our view, respondents and the IA arguments regarding claim construction are not persuasive. We therefore do not accept their proposed claim construction.

d. The Proposed Construction of "Inhibited"; Indefiniteness

Since we have concluded that "desired selectivity" is not part of the definition of "controlled amount of protic material" and since we have not accepted the claim construction advanced by respondents and the IA, the issue of claim construction (and of indefiniteness) turns on the meaning of the term "inhibits" or "inhibited" and whether the claims, specification, and prosecution history would provide a person of ordinary skill in the art with knowledge of what constitutes "inhibition." This was the subject of one of the Commission's questions to the parties:

> 3. Referring to the ALJ's definition of "controlled amount of protic material" in the ID at 78-79, what is the meaning of the terms "inhibited" and "desired selectivity"? How are these terms applied to determine infringement by the accused processes? With respect to the claim construction of "controlled amount of protic material" adopted in the ID, what is the evidence that the claims, specification, and prosecution history would provide a person of ordinary skill in the art with knowledge of what constitutes "inhibition" and the "desired selectivity"?

In response, Flexsys argues that "'inhibits' means that the reaction is inhibited 'to the extent where the reaction is no longer significant.'" Flexsys Br. 21. Flexsys also argues that the ALJ found that the specifications provide teachings that inform one skilled in the art of the effect of controlling protic material on conversion and selectivity. Flexsys Br. 22-23. Finally, Flexsys argues that it is not necessary to construe the term "inhibited" (or "desired selectivity") because respondents' expert "admitted that Sinorgchem's process met the claim limitation 'controlled amount of protic material' as it was ultimately defined by Judge Luckern." Flexsys Br. 22.

Respondents and the IA argue that the specification teaches that the reaction is inhibited or unacceptable when the amount of protic material (water in this case) exceeds "about 4%" and for the DMSO solvent system the reaction is inhibited or unacceptable when the amount of protic material exceeds "about 8%" and is otherwise silent. Sinorgchem Br. 16-17; IA Br. 16-17. As discussed above, we have not accepted the claim construction advanced by respondents and the IA. Addressing the ID's claim construction, respondents argue there is no objective anchor that would allow the public to determine the scope of the claims and thus they are indefinite, relying on the recent decision of the Federal Circuit in *Datamize, LLC v. Plumtree Software, Inc.*, 417

F.3d 1342 (Fed. Cir. 2005). Sinorgchem Br. 17. In *Datamize*, the Federal Circuit found the claim term "aesthetically pleasing" indefinite because neither the intrinsic nor the extrinsic evidence provided any objective standard for determining when that claim term was met.

Respondents also argue that there is no teaching or explanation as to how "inhibited" should be applied to determine infringement by the accused process. Sinorgchem Br. 18-19. Further, respondents argue that there is no evidence that the claims, specification, and prosecution history would provide a person of ordinary skill in the art with knowledge of what constitutes "inhibition." Sinorgchem Br. 19-22.

In our view, a person of ordinary skill in the art would understand that the '063 patent employs the term "inhibits" as meaning "inhibits to the extent where the reaction is no longer significant," as argued by Flexsys. However, the question is whether the claims, specification, and prosecution history would provide a person of ordinary skill in the art with knowledge of when the reaction is no longer "significant" or some benchmark by which the existence of such "significance" can be determined. There is no express teaching in the '063 patent in this regard. Flexsys argues that given the teachings of the specification, a person of ordinary skill in the art could determine the upper and lower limits of protic material, given a set of reaction conditions. Flexsys' argument begs the question, since any such determination would depend on when the aniline/nitrobenzene reaction is no longer acceptable or significant. The question is one of definiteness, not enablement.

Nevertheless, we have examined the specification and have concluded that a person of ordinary skill in the art could assign a meaning to "significant" in the context used in the specification. Specifically, the specification states: "The upper limit for amount of protic material present in the reaction varies with the solvent. For example, when DMSO is utilized as the solvent and tetramethylammonium hydroxide is utilized as the base, the upper limit on the amount of protic material present in the reaction is about 8 percent H_2O based on the volume of the reaction mixture." '063 patent, col. 4, ll. 52-58. Example 8 of the '063 patent is an example which uses DMSO as the solvent and tetramethylammonium hydroxide as the base. It "illustrates the effect that the amount of protic material present in or added to the reaction has on the extent of conversion and yields of 4-NDPA and p-NDPA." '063 patent, col. 11, ll. 10-13. It is the only example in the '063 patent expressly directed to this purpose. Table 6 of Example 8 shows the effect on the percent conversion of nitrobenzene as the volume and percentage of water increases.[7] Specifically, it shows that when the percent of water increases from 6 percent to 9.75 percent, the percent conversion of nitrobenzene drops steeply, from 63 percent to 12 percent.

In our view, given the foregoing information, a person of ordinary skill in the art would conclude that Example 8 is the origin of the statement in the PARAGRAPH that the upper limit of protic material (water) should be about 8 percent when DMSO is the solvent. That person would also conclude that the minimum acceptable conversion rate would be more than 12

---

[7] Table 6 also shows that as the percentage of water increases, the yield (of desired products) also decreases. However, certain numbers relating to yield in Table 6 in the '063 patent were changed in Table 6 of the '111 patent because of what the applicants stated were obvious typographical errors, the applicants representing to the PTO examiner that the corrections did not constitute new matter. CX-4, pp. 111-077, 111-082 to 111-083.

percent, but less than 63 percent. Further, that person could perform the example using 8 percent water, the percentage referred to in the PARAGRAPH, and determine the conversion rate for that percent water, a number between 12 percent and 63 percent. We are aware that the inventors and Flexsys' expert have testified (generally and also with respect to several examples, including Example 8) that what constitutes an acceptable reaction is up to the individual practitioner. Indeed, respondents and the IA rely on this testimony to show that the claims are indefinite under *Datamize*. Sinorgchem Br. 21-22; IA Br. 12-14. However, this testimony cannot be accepted because it constitutes extrinsic evidence inconsistent with construction of the claims based on the intrinsic evidence, *i.e,*, the specification.[8]

B. Infringement

1. Applicable Law

Direct infringement requires a two-step analysis. First, the claims must be construed and then the trier of fact must determine whether the claims cover the accused device or process. *Smithkline Diagnostics, Inc. v. Helena Labs. Corp.*, 859 F.2d 878, 889 (Fed Cir. 1988). The burden is on the patent owner to prove infringement by a preponderance of the evidence. *Id.* Such proof must show that every limitation of the patent claims asserted to be infringed is found in the accused device [or process], either literally or by an equivalent. *Id.*

---

[8] If the claims cannot be construed as we have described, then this extrinsic evidence could be considered and could result in the claims being invalid for indefiniteness as argued by respondents and the IA.

2. Sinorgchem and Sovereign

a. The ALJ's Determination

Having construed the claims so that water as the protic material could be greater than 4 percent by volume of the reaction mixture, the ALJ found that the Sinorgchem processes for making 4-ADPA and 6PPD literally infringe the asserted claims in issue. ID 97-102. Sinorgchem had defended those processes on the basis that water as the protic material therein was greater than 4 percent [ ] of the volume of the reaction mixture. In light of his finding of infringement by Sinorgchem, the ALJ found that Sovereign's importation into, and sale within, the United States of 6PPD purchased from Sinorgchem in China is a violation of section 337, since it involves infringement of at least method claim 61 of the '063 patent and method claim 11 of the '111 patent. ID 102.

b. Analysis and Determination

Sinorgchem argues that [ ] Sinorgchem Petition for Review ("Sinorgchem Pet.") 9. [ ] Sinorgchem Pet. 9. According to Sinorgchem, [ ] Sinorgchem Pet. 9. It is this last fact that avoids infringement according to Sinorgchem, because, if the claims are properly construed, they only cover a process where the water content is no more than 4 percent. Sinorgchem Pet. 47-48. Sinorgchem also argues that it does not infringe under the doctrine of equivalents, but notes that the ALJ did not reach this issue. Sincorgchem Pet. 49-50. Flexsys opposes these arguments at pages 75-78 of its response and further argues that, under Sinorgchem's construction of "controlled amount of protic material," Sinorgchem would infringe the asserted claims under the doctrine of equivalents. Flexsys Response to Petitions for Review ("Flexsys Resp.") 72-78.

Sinorgchem's infringement argument depends principally on acceptance of its proffered claim construction. As discussed above, we have determined not to accept that claim construction. Sinorgchem also argues that the ALJ did not address infringement in terms of "inhibition" of the aniline/nitrobenzene reaction. Sinorgchem Br. 18. However, he did refer to the testimony of respondents' expert, Dr. Fu, (ID 100-101) and did find that [ ] the 63 percent which was apparently acceptable in Example 8, as discussed above. Sinorgchem did not challenge the finding of infringement of 4-ADPA as exceeding the reach of section 337(a)(1)(B)(ii); thus, Sinorgchem waived the issue. Accordingly, we agree with the ALJ's conclusion regarding infringement by Sinorgchem.

2. KKPC

a. The ALJ's Determination

According to the ALJ, KKPC has not made 4-ADPA for commercial purposes since 1995, but has continued to produce 6PPD commercially made from 4-ADPA that it purchases from third party commercial vendors, including Sinorgchem. ID 103. KKPC produces its commercial 6PPD by the known process of reductive alkylation using methyl isobutyl ketone in the presence of hydrogen and a catalyst. ID 103. The ALJ found that to prevail on its allegation of infringement, Flexys must prove that KKPC performs all of the recited steps of the asserted claims, citing *Canton Bio-Medical, Inc. v. Integrated Liner Techs., Inc.*, 216 F.3d 1367, but that it had failed to introduce evidence that KKPC performed any steps of the asserted claims and that KKPC's witnesses stated that KKPC only carries out the final reductive alkylation step of the 6PPD ('111) process claims. ID 104. He concluded that Flexys had not met its burden to establish direct infringement by KKPC. ID 104. He rejected any argument of indirect infringement or that KKPC was a joint infringer, stating that the only relationship between KKPC and Sinorgchem is that of commercial buyer and seller. ID 104-105.

b. Analysis and Determination

In its petition for review[9], Flexys argues that the ALJ erred as matter of law in finding KKPC did not violate section 337 because, according to Flexsys, section 337(a)(1)(B)(ii) only requires that the accused imported article be made by means of a process covered by the asserted claims regardless of whether two entities collectively practice the process. Flexsys Petition for Review ("Flexsys Pet.") 7-28. Flexsys' argument relates to claim 61 of the '063 patent and claim 11 of the '111 patent, both of which cover processes for making 6PPD. However, near the end of its petition, Flexsys makes the additional argument that the 6PPD KKPC makes and sells is also covered by claim 30 of the '063 patent and claim 7 of the '111 patent, which cover processes for

---

[9] The arguments relating to his issue are largely presented in the Flexsys' petition for review and KKPC's response thereto, although there is reference to these arguments in the briefs on review.

making 4-ADPA, a compound KKPC does not make, but purchases and alkylates to make its 6PPD. Flexsys Pet. 28-34.

Flexsys' argument is based on its interpretation of section 337(a)(1)(B)(ii), which provides:

> § 1337. Unfair practices in import trade
>
> (a) Unlawful activities; covered industries; definitions
>
> > (1) Subject to paragraph (2), the following are unlawful, and when found by the Commission to exist shall be dealt with, in addition to any other provision of law, as provided in this section:
> >
> > * * *
> >
> > > (B) The importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that–
> > >
> > > > (i) infringe a valid and enforceable United States patent or a valid and enforceable United States copyright registered under Title 17; or
> > > >
> > > > *(ii) are made, produced, processed, or mined under, or by means of, a process covered by the claims of a valid and enforceable United States patent.*

19 U.S.C. § 1337(a)(1)(B)(ii) (emphasis supplied).

This provision was originally enacted as section 337a in 1940 to overrule the holding of the U.S. Court of Customs and Patent Appeals (now the U.S. Court of Appeals for the Federal Circuit) in *In re Amtorg Trading Corp.*, 75 F.2d 826 (CCPA), *cert. denied*, 296 U.S. 576 (1935). Section 337(a)(1)(B)(ii) was reenacted in its present form in the Omnibus Trade and Competitiveness Act of 1988. The history of that provision is recounted in *Amgen, Inc. v. U.S.*

International Trade Commission, 902 F.2d 1532, 1538-40 (Fed. Cir. 1990).

Neither Flexsys nor the other parties have referred to any definitive holding by our appellate court as to whether all the steps of a claimed process must be performed by one person in order to find a violation of section 337(a)(1)(B)(ii). Notwithstanding the various arguments made by Flexsys, the relevant inquiry is one of statutory construction. In our view, Flexsys has failed to demonstrate that its position on statutory construction is correct. In *Amtorg,* the claimed processes at issue were performed in what was then the Soviet Union by a single entity. Thus, the circumstances presented in this case were not present in *Amtorg*. While Congress clearly intended to overrule *Amtorg*, it is going too far to say that Congress intended to address an issue that was not present in that case. Certainly, nothing in the legislative history cited by Flexsys indicates that Congress intended to do so. Accordingly, there is nothing in the statute or the legislative history raised by Flexsys that supports its interpretation.

We agree with KKPC and the IA that Flexsys has waived assertion of the 4-ADPA claims against KKPC, as it asserted only the 6PPD claims in its post-hearing brief. Further, it is undisputed that KKPC does not perform any of the steps of the 4-ADPA claims.

Given that we have concluded that Flexsys has not shown that KKPC's reductive alkylation of purchased 4-ADPA to make 6PPD constitutes infringement of the asserted 6PPD claims, it is not necessary address KKPC's licensing and estoppel defenses, which raise issues of foreign law. We therefore take no position on those issues, as permitted under *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421 (Fed. Cir. 1984).

C. Invalidity for Obviousness

1. Applicable Law

A patent is presumed valid. 35 U.S.C. § 282. The burden of showing invalidity is on the challenger, who must do so by clear and convincing evidence. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1375 (Fed. Cir. 1986).

One of the grounds for invalidity is obviousness of the claimed invention. The patent law provides that an invention will not be patentable if it would have been obvious to a person of ordinary skill in the art at the time it was made. The pertinent provision is 35 U.S.C. § 103(a):

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The above provision was originally enacted as 35 U.S.C. § 103 in the Patent Act of 1952. The leading case on obviousness is the 1966 decision of the Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1 (1966) in which the Court construed 35 USC § 103 as requiring a four-part inquiry: (1) determining the scope and content of the asserted prior art; (2) identifying the differences between that prior art and the claimed invention; (3) determining the level of ordinary skill in the art at the time the invention was made; and (4) assessing the "secondary considerations" which may demonstrate nonobviousness (often referred to as the objective indicia of nonobviousness).

Obviousness is a conclusion of law based on the underlying factual findings which are the result of the foregoing inquiry. *In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991). Perhaps the best description of the analysis to be performed is that authored by former Chief Judge Markey of the Federal Circuit:

> With the involved facts determined, the decisionmaker confronts a ghost, i.e., " a person having ordinary skill in the art," not unlike the "reasonable man" and other ghosts in the law. To reach a proper conclusion under § 103, the decisionmaker must step backward in time and into the shoes worn by that "person" when the invention was unknown and just before it was made. In light of *all* the evidence, the decisionmaker must then determine whether the patent challenger has convincingly established, 35 U.S.C. § 282, that the claimed invention as a whole would have been obvious at *that* time to *that* person....

Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1566 (Fed. Cir. 1987) (emphasis in original).

2. The ALJ's Determination

The ALJ rejected respondents' arguments that the asserted claims are invalid for obviousness in view of a 1903 article by Wohl published in *Chemische Berichte* and other prior art. ID 107-114.[10]

The obviousness dispute centers on the Wohl reference, which, as discussed below, discloses a process which results, *inter alia*, in a 4-ADPA intermediate. Sinorgchem argues that the process disclosed by Wohl is the same as that of steps (a) and (b) of the asserted claims, the steps which call for the reaction of aniline and nitrobenzene to form 4-ADPA intermediates, and that the claimed processes would have been obvious in view of Wohl and the other prior art. The other prior art discloses processes for making 4-ADPA intermediates, reducing those

---

[10] The ALJ also denied the motion of KKPC and Sinorgchem to strike evidence of the purported replication of a Wohl reaction involving aniline and nitrobenzene. ID 105-107 .

intermediates to 4-ADPA, and reductively alklyating the 4-ADPA to 6PPD.

The ALJ found that Wohl does not disclose steps (a) and (b) of the claimed methods in issue. ID 113. He rejected respondents' argument that one skilled in the art would reasonably expect to successfully use the 4-ADPA intermediate made by the Wohl method to produce 4-ADPA and/or 6PPD, since he found that the 4-ADPA intermediate disclosed in Wohl is not made by the methods of the claims in issue. ID 113.

The ALJ also found that there is no evidence in the record that in the 88 years between the publication of Wohl and the time Bashkin began his work that anyone in the rubber chemical industry ever considered using the Wohl reaction as a starting point for producing 4-ADPA or 6PPD. ID 113. He concluded that respondents' arguments to combine prior art to meet the limitations in issue is motivated solely by hindsight. ID 113. He also found objective indicia of nonobviousness in Flexsys' construction of a pilot plant and the subsequent expenditure of some 80 million dollars to build a facility for producing 4-ADPA intermediates according to the methods of the claims in issue. ID 113-114.

Sinorgchem argues that the ALJ erred in his assessment of Wohl and in his analysis of obviousness (Sinorgchem Pet. 34-47); Flexsys opposes (Flexsys Resp. 44-60).[11] The IA agrees with Sinorgchem that the ALJ erred with respect to several factual findings regarding what Wohl discloses, but argues that Sinorgchem has failed to demonstrate that the ALJ erred in finding that one of ordinary skill in the art would not have been motivated to use Wohl's disclosure. IA Pet.

---

[11] The arguments on obviousness in this case are set out in Sinorgchem's petition for review and the responses thereto.

3.

3. Analysis and Determination

Since we have construed the claims somewhat differently than the ALJ, we revisit obviousness.

The Wohl reference was originally published in German; translations accompanied the exhibit copies provided in this case. RX-9; RX-43. Wohl was cited by the Patent and Trademark Office ("PTO") examiner during the examination of both the '063 and '111 patents. As found by the ALJ, Wohl discloses the reaction of aniline and nitrobenzene in the presence of alkali [base] to form several products, including about 3 percent p-nitrosodiphenylamine, a 4-ADPA intermediate. ID 110. There was testimony that water was generated in situ during the reaction in Wohl, but that "there was no reason to believe" there was any water present after the reaction has been run "at least for a while" because the temperature at which Wohl conducted his reaction was above the boiling point of water. This testimony would indicate that water is present during the course of the reaction in Wohl, at least for some period of time.

As noted above, the ALJ found that all parties are in agreement that a person of ordinary skill in the art in the field of the '063 and '111 patents in 1990 "would have a masters degree or equivalent." ID 37. He also found that in view of the technology in issue, that such a person should have at least a masters degree in organic chemistry and some experience in the art of making 4-ADPA in view of the "Related Art" sections set forth in the '063 and '111 patents. ID 37.

As to the objective indicia of nonobviousness, the ALJ and Flexsys point to the long period of time between Wohl and the claimed invention and the investment made by Flexsys in its plant using the claimed method. Sinorgchem points out that the time span is not relevant because, before the invention was made, environmental concerns would have motivated persons of ordinary skill in the art to find a chlorine-free method for making 4-ADPA intermediates as was Monsanto's motivation when it arrived at the invention it claimed in the '063 patent. Sinorgchem Pet. 37-41. As to Flexsys' investment in its 4-ADPA plant, the ALJ appears to have treated this as an example of the commercial success of the claimed invention. Sinorgchem argues that the mere expenditure of money by Monsanto and Sinorgchem is insufficient to make out commercial success. Sinorgchem Pet. 46-47.

In our view, respondents have not carried their burden of showing obviousness. While Wohl discloses the reaction of aniline with nitrobenzene and the formation of a small amount of intermediate, and while it may also disclose the presence of water as a protic material, there is no disclosure in Wohl of whether or how water or any other protic material affects the conversion of nitrobenzene. At best, Wohl may invite persons of ordinary skill in the art to experiment with its disclosure. However, "obvious to try" is not the standard for determining obviousness. *In re O'Farrell,* 853 F.2d 903 (Fed. Cir. 1988).

D. Domestic Industry Requirement

1. Applicable Law

As a prerequisite to finding a violation of section 337, Flexsys must establish that "an industry in the United States, relating to the articles protected by the [intellectual property right] ... concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). Typically, the domestic industry requirement of section 337 is viewed as consisting of two prongs: the technical prong and the economic prong. *Certain Variable Speed Wind Turbines and Components Thereof,* Inv. No. 337-TA-376, Comm'n Opinion at 14-17 (1996). The technical prong involves whether the complainant (or its licensees) practice at least one claim of the asserted patents (the claim need not be one asserted to be infringed). The economic prong concerns domestic activities with respect to the patent or patented article. To satisfy the economic prong, these activities must involve: (1) significant investment in plant and equipment; (2) significant employment of labor or capital; or (3) substantial investment in exploitation of the patent, including engineering, research and development, or licensing. 19 U.S.C. § 1337(a)(3). Satisfaction of the economic criteria of the domestic industry requirement under section 337 is not determined by a rigid formula.

2. The ALJ's Determination

The ALJ noted that the domestic industry requirement has a technical prong and an economic prong and that the Commission had previously determined not to review Order No. 28, in which he had found that Flexsys met the economic prong. ID 119-120. As to the technical prong, he found that Flexsys produces 4-ADPA at its plant in Antwerp, using a process covered by claim 30 of the '063 patent and claim 7 of the '111 patent. ID 120-122. He found that Flexsys ships the 4-ADPA from Antwerp to its plant in Sauget, Illinois where it alkylates the 4-ADPA to produce 6PPD. ID 120. On that basis, he also found that Flexsys practices claim 61 of the '063 patent and claim 11 of the '111 patent.

3. Analysis and Determination

Sinorgchem argues that because the water content of Flexsys' process is approximately 8.5% at the end of the aniline-nitrobenzene coupling reaction, when aniline is the solvent, Flexsys cannot meet the "about 4%" water required by what Sinorgchem argues is the proper construction of the asserted claims. Sinorgchem Pet. 50.[12] Since we have determined not to accept the claim construction of respondents and the IA, we affirm the ALJ's determination that Flexsys has met the technical prong of the domestic industry requirement and has shown the existence of a domestic industry.

VI. REMEDY, PUBLIC INTEREST, AND BONDING

The ALJ recommended issuance of limited exclusion orders against the products of Sinorgchem and Sovereign made by the processes covered by the asserted claims, but that no bond be required for importation during the Presidential review period. ID 130-134.

A. Remedy

The usual remedy for a violation of section 337 is a limited exclusion order. However, if the criteria of section 337(d)(2) are satisfied, the Commission may issue a general exclusion order. Further, under section 337(f), the Commission may issue cease and desist orders against respondents over whom it has personal jurisdiction. The Commission's practice is to issue cease and desist orders to domestic respondents who maintain a commercially significant inventory of the infringing imported products. *Certain Neodymium-Iron-Boron Magnets, Magnet Alloys, and Articles Containing Same*, Inv. No. 337-TA-372 (Comm'n Opn. Pp. 13-14)(USITC Pub. 2964

---

[12] Sinorgchem's argument on domestic industry is contained in its petition for review.

(May 1996).

The ALJ recommended that limited exclusion orders be issued to Sinorgchem, as to all of the claims in issue, and to Sovereign, as to claim 61 of the '063 patent and claim 11 of the '111 patent. ID 131. He also recommended that those orders apply not only to those respondents but also to any affiliated companies, parents, subsidiaries, licensees, contractors, or other related business entities, or successors or assigns of those respondents. ID 131-132. Since only process claims are in issue, the ALJ recommended a certification provision to permit Customs to determine whether any importation falls within the limited exclusion order. ID 132.

The ALJ stated that Flexsys had agreed not to pursue relief against downstream products. ID 131 n. 42. He earlier stated that any remedial order should not cover products made by KKPC's PPD1 and PPD2 processes, since they had been removed from his consideration. ID 97 n. 32.

All parties agree that if a violation is found, a limited exclusion order is appropriate, though there is variation in some of the terms they argue for. Flexsys Br. 50-58, Sinorgchem Remedy Brief ("Sinorgchem Rem. Br.") 3-7; KKPC Br. 6-8; IA Remedy Brief ("IA Rem. Br.") 3-5. Neither Flexsys nor the IA has requested a cease and desist order. Both Flexsys and the IA have submitted draft limited exclusion orders.

We have determined to issue a limited exclusion order as recommended by the ALJ. As the order applies to Sinorgchem, it excludes both 4-ADPA and 6PPD made by the processes of the asserted claims.[13] As it applies to Sovereign, the order excludes 6PPD made by the process

---

[13] Sinorgchem's brief on remedy contemplates relief directed to 4-ADPA; accordingly, Sinorgchem waived this issue.

of the asserted 6PPD claims. The order includes a certification provision, but we have not included a provision to require importers to identify their manufacturers, as requested by Flexsys. Such identification is opposed by Sinorgchem and the IA. Since KKPC does not infringe, the order is not directed to products of KKPC.[14] The order applies only to imports for consumption, as Flexsys has not requested exclusion of imports under other types of entry. *See, Certain Devices for Connecting Computers via Telephone Lines*, Inv. No. 337-TA-360, Comm. Opinion at 8-9, USITC Pub. 2843 (Dec. 1994).

B. Public Interest

Section 337(d) provides that on finding a violation of section 337, the Commission will issue an exclusion order

> ...unless, after considering the effect of such exclusion upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers, it finds that such articles should not be excluded from entry.

We note that the public interest analysis does not focus on whether there is a public interest in issuing remedial orders, but whether the issuance of those orders will adversely affect the public interest.

Flexsys argues that a limited exclusion order will not have an adverse affect on any of the foregoing public interest factors. Flexsys Rem. Br. 58-60. The IA agrees. Sinorgchem agrees as

---

[14] Flexsys argues that even if the Commission finds no violation with respect to KKPC, the limited exclusion order should nevertheless cover 6PPD made by KKPC from 4-ADPA made by Sinorgchem. Such a provision would obviously vitiate the finding of no violation of section 337 with respect to KKPC and we have not included it in the order.

long as the order is limited to 4-ADPA and 6PPD made by an infringing process. Sinorgchem Rem. Br. 9. KKPC also agrees as long as the order as applied to it is limited to 6PPD made by an infringing process and specifically excludes its PPD1 and PPD2 processes. KKPC Br. 9.

Given the agreement of the parties on this point, we determine that issuance of the limited exclusion order will not adversely affect the public interest.

C. Bonding

During the Presidential review period, imported articles otherwise subject to a remedial order are entitled to conditional entry under bond, pursuant to section 337(j)(3). 19 U.S.C. § 1337(j)(3). The amount of the bond is specified by the Commission and must be an amount sufficient to protect the complainant from any injury. *Id.*

The ALJ recommended that no bond be required for temporary importation during the Presidential review period. ID 134. He found "no evidence in the record to support any bond to offset any competitive advantage resulting from the unfair acts of Sinorgchem and Sovereign from their importations." ID 134.

The Commission typically bases the amount of the temporary importation bond on the price differential between the complainant's product and the infringing imports. Flexsys argues that the bond should be set at 100 percent of entered value, referring to Commission cases which imposed such an amount when pricing information was insufficient. Flexsys Br. 61-64. Sinorgchem argues that the Commission should follow the ALJ's recommendation, noting that the Commission has used various methods for computing the amount of bond. Sinorgchem Rem. Br. 7-8. Sinorgchem further argues that the absence of pricing information here is because of

Flexsys' failure to provide evidence of pricing and that Flexsys should not benefit from its failure to provide evidence. Sinorgchem Br. 8. The IA makes a similar argument, arguing further that the Commission has considerable discretion in setting the amount of temporary importation bond. IA Rem. Br. 7-8. In response, Flexsys argues it has no burden of proof with respect to bonding and that the simple existence of a violation should be sufficient to support a 100 percent bond, with respondents having the burden to show that a lower bond is appropriate. Flexsys Reply 47-48.

We find the ALJ's recommendation appropriate in the circumstances here and have determined not to require that a bond be posted for temporary importation. In our view, the complainant has the burden of supporting any proposition it advances, including the amount of the bond. Flexsys did not meet that burden.

VII. KKPC's MOTION TO STRIKE

KKPC has moved to strike the three non-party submissions which discuss 35 U.S.C. § 271(g) because they do not relate to remedy, public interest, or bonding, and to strike Appendix 1 of Flexsys' initial review submission because to consider the Korean case law it contains would constitute improperly augmenting the record as it relates to KKPC's licensing and estoppel defenses. The IA agrees with KKPC. Flexsys opposes. KKPC has moved for leave to file a reply to Flexsys' opposition, attaching a proposed reply.

Our disposition of this case has not required consideration of the matters raised in the three non-party letters or of KKPC's licensing and estoppel defenses. We therefore deny as moot KKPC's motion to strike and its motion for leave to file a reply.

By Order of the Commission

Marilyn R. Abbott
Secretary to the Commission

Issued: July 21, 2006

CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME **337-TA-533**

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **Commission Opinion** has been served on upon all parties and Commission Investigative Attorney, Juan Cockburn, Esq. via first class mail and air mail where necessary on
July 21, 2006.

Marilyn R. Abbott

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

COUNSEL FOR COMPLAINANT FLEXSYS AMERICA L.P.:

Gregory C. Dorris, Esq.
Charles H. Carpenter, Esq.
PEPPER HAMILTON LLP
Hamilton Square
600 14th Street, NW
Washington, DC 20005-2004

Eric C. Cohen, Esq.
Charles R. Krikorian, Esq.
KATTEN MUCHIN ZAVIS ROSENMAN
525 West Madison
Chicago, IL 60661-3693

Gary Ropski, Esq.
Chikiu Chan, Esq.
BRINKS HOFER GILSON & LIONE
NBC Tower
455 North Cityfront Plaza
Suite 3600
Chicago, Illinois 60611

ON BEHALF OF STOLT-NIELSEN TRANSPORTATION GROUP LTD.:

J. Mark Gidley, Esq.
Peter J. Carney, Esq.
Christopher F. Corr, Esq.
Corey L. Norton, Esq.
Matthew J. Vlissides, Jr., Esq.
WHITE & CASE LLP
701 13th Street, NW
Washington, DC 20005

ON BEHALF OF RESPONDENT KOREA KUMHO PETROCHEMICAL CO., LTD.:

Guy W. Chambers, Esq.
Maureen Sheehy, Esq.
TOWNSEND TOWNSEND & CREW
Two Embarcadero Center
Eighth Floor
San Francisco, CA 94111

V. James Adduci II, Esq.
Barbara A. Murphy, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, LLP
1200 17th Street, NW
Washington, DC 20036

George G. Strong, Jr.
Managing Director
CORNERSTONE RESEARCH
555 South Flower Street, Suite 2750
Los Angeles, CA 90071-2300

Robert G. Badal, Esq.
Edward J. Slizewski, Esq.
HELLER EHRMAN LLP
333 S. Hope Street
Suite 3900
Los Angelos, CA 90071-3043

Alan H. Blankenheimer, Esq.
HELLER EHRMAN LLP
4350 La Jolla Village Drive – 7th Floor
San Diego, California 92122

<u>ON BEHALF OF SOVEREIGN CHEMICAL CO.:</u>

James K. Kearney, Esq.
WOMBLE, CARLYLE SANDRIDGE & RICE LLP
1401 I Street, NW, 7th Floor
Washington, DC 20005

Nanda K. Alapati, Esq.
WOMBLE, CARLYLE SANDRIDGE & RICE LLP
8065 Leesburg Pike, 4th Fl.
Tysons Corner, VA 22182-2738

Scott M. Oldham, Esq.
HAHN LOESER & PARKS LLP
One GOJO Plaza, Suite 300
501 S Main Street
Akron, OH 044311-1076

Deborah A. Coleman, Esq.
HAHN LOESER & PARKS LLP
3300 BP Tower
200 Public Square
Cleveland, OH 44114

<u>ON BEHALF OF SINORGCHEM CO., LTD.:</u>

Paul J. Zegger, Esq.
ARNOLD & PORTER LLP
555 12th Street, NW
Washington, DC 20004

Shanlon Wu, Esq.
KING AND WOOD PRC Lawyers
31st Fl., Tower A. Jianwei SOHO,
39 Dongsanhuan Zhonglu
Chaoyang District, Beijing 100022
People's Republic of China

Manni Li, Esq.
VENABLE LLP
575 7th Street, NW
Washington, DC 20004

Marcia H. Sundeen, Esq.
KENYON & KENYON
1500 K Street, NW
Washington, DC 20005

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of

CERTAIN RUBBER ANTIDEGRADANTS,
COMPONENTS THEREOF, AND
PRODUCTS CONTAINING SAME

Inv. No. 337-TA-533

NOTICE OF COMMISSION DETERMINATION TO REVIEW A FINAL INITIAL DETERMINATION; SCHEDULE FOR FILING WRITTEN SUBMISSIONS ON THE ISSUES UNDER REVIEW AND ON REMEDY, THE PUBLIC INTEREST, AND BONDING

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to review in its entirety the final initial determination ("ID") issued by the presiding administrative law judge ("ALJ") on February 17, 2006, in the above-captioned investigation.

FOR FURTHER INFORMATION CONTACT: Wayne Herrington, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3090. Copies of the ALJ's ID and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone 202-205-2000. General information concerning the Commission may also be obtained by accessing its Internet server (*http://www.usitc.gov*). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this section 337 investigation on March 29, 2005, based on a complaint filed by Flexsys America LP. 70 *Fed. Reg*. 15885 (March 29, 2005). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain rubber antidegradants, components thereof, and products containing same that infringe claims 30 and 61 of U.S. Patent No. 5,117,063 ("the '063 patent"), claims 7 and 11 of U.S. Patent No. 5,608,111 ("the '111 patent"), and claims 1, 32, and 40 of U.S. Patent No. 6,140,538 ("the '538 patent"). The complaint and notice of investigation named five respondents. The investigation was subsequently terminated as to two respondents and as to the '538 patent.

On February 17, 2006, the ALJ issued his final ID finding a violation of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), by respondents Sinorgchem Co., Shandong, and Sovereign Chemical Company, but finding no violation of section 337 by respondent Korea Kumho Petrochemical Co., Ltd. The ALJ recommended that the Commission issue limited exclusion orders, but did not recommend that any bond be imposed for importations during the Presidential review period. All parties petitioned for review of various parts of the final ID.

Having examined the record in this investigation, including the ALJ's final ID, the petitions for review, and the responses thereto, the Commission has determined to review the final ID in its entirety. The Commission's review includes the issue of whether the ALJ properly determined that the issue of infringement by the P1 and P2 processes of Korea Kumho Petrochemical Co., Ltd. was not before him, but that review is only for the purpose of making a correction to the final ID, i.e., to substitute "Motion No. 533-61" for "Motion No. 533-57" on page 96 of the final ID. The Commission has otherwise concluded that the ALJ was correct in his determination on this issue.

On review, the Commission requests briefing based on the evidentiary record. While the Commission has determined to review the final ID in its entirety, it is particularly interested in briefing on the issues of claim construction and indefiniteness, especially with respect to the term "controlled amount of protic material," which appears in all the asserted claims. In addressing the question of claim construction, each party should specifically identify those portions of the claim language, specification, and prosecution history (and other evidence, if appropriate) which support the construction it advocates. The Commission is also interested in receiving answers to the following questions:

1. With respect to the ID's construction of the term "controlled amount of protic material," what is the basis for including "the desired selectivity," given that col. 4, ll. 48-50 ('063 patent) states: "A 'controlled amount' of protic material is an amount up to that which inhibits the reaction of aniline with nitrobenzene...," a statement which does not contain the term "selectivity"?

2. Given that the '111 patent is based on a continuation-in-part application, what is the legal basis for using matter in the claims and specification of that patent not common to the disclosure of the '063 patent to construe the claims of the '063 patent? What is the legal basis for using the prosecution history of the '111 patent to construe the claims of the '063 patent?

3. Referring to the ALJ's definition of "controlled amount of protic material" in the ID at 78-79, what is the meaning of the terms "inhibited" and "desired selectivity"? How are these terms applied to determine infringement by the accused processes? With respect to the claim construction of "controlled amount of protic material" adopted in the ID, what is the evidence that the claims, specification, and prosecution history would provide a person of ordinary skill in the art with knowledge of what constitutes "inhibition" and the "desired selectivity"?

4. With respect to the licensing issues raised by Korea Kumho Petrochemical Co., Ltd., which are stated to be subject to Korean law, state the applicable Korean law and discuss how it applies.

5. With respect to the estoppel issue raised by Korea Kumho Petrochemical Co., Ltd., state what law (Korean, U.S., or other) applies and how it applies.

In connection with the final disposition of this investigation, the Commission may (1) issue an order that could result in the exclusion of the subject articles from entry into the United States, and/or (2) issue one or more cease and desist orders that could result in respondents being required to cease and desist from engaging in unfair acts in the importation and sale of such articles. Accordingly, the Commission is interested in receiving written submissions that address the form of remedy, if any, that should be ordered. If a party seeks exclusion of an article from entry into the United States for purposes other than entry for consumption, the party should so indicate and provide information establishing that activities involving other types of entry either are adversely affecting it or likely to do so. For background, see *In the Matter of Certain Devices for Connecting Computers via Telephone Lines*, Inv. No. 337-TA-360, USITC Pub. No. 2843 (December 1994) (Commission Opinion).

If the Commission contemplates some form of remedy, it must consider the effects of that remedy upon the public interest. The factors the Commission will consider include the effect that an exclusion order and/or cease and desist orders would have on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) U.S. production of articles that are like or directly competitive with those that are subject to investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions that address the aforementioned public interest factors in the context of this investigation.

If the Commission orders some form of remedy, the President has 60 days to approve or disapprove the Commission's action. During this period, the subject articles would be entitled to enter the United States under bond, in an amount determined by the Commission and prescribed by the Secretary of the Treasury. The Commission is therefore interested in receiving submissions concerning the amount of the bond that should be imposed.

WRITTEN SUBMISSIONS: The parties to the investigation are requested to file written submissions on the issues under review. The submissions should be concise and thoroughly referenced to the record in this investigation. Parties to the investigation, interested government agencies, and any other interested parties are encouraged to file written submissions on the issues of remedy, the public interest, and bonding. Such submissions should address the February 17, 2006, recommended determination by the ALJ on remedy and bonding. Complainant and the Commission investigative attorney are also requested to submit proposed remedial orders for the Commission's consideration. The written submissions and proposed remedial orders must be filed no later than close of business on April 24, 2006. Reply submissions must be filed no later than the close of business on May 1, 2006. No further submissions on these issues will be permitted unless otherwise ordered by the Commission.

Persons filing written submissions must file the original document and 12 true copies thereof on or before the deadlines stated above with the Office of the Secretary. Any person desiring to submit a document (or portion thereof) to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment during the proceedings. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. *See* section 201.6 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 201.6. Documents for which confidential treatment by the Commission is sought will be treated accordingly. All nonconfidential written submissions will be available for public inspection at the Office of the Secretary.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.42-.46 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.42-.46).

By order of the Commission.

Marilyn R. Abbott

Marilyn R. Abbott
Secretary to the Commission

Issued: April 13, 2006

CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME **337-TA-533**

CERTIFICATE OF SERVICE

I Marilyn R. Abbott, hereby certify that the attached **NOTICE OF COMMISSION DETERMINATION TO REVIEW A FINAL DETERMINATION; SCHEDULE FOR FILING WRITTEN SUBMISSIONS ON THE ISSUES UNDER REVIEW AND ON REMEDY, THE PUBLIC INTEREST, AND BONDING** has been served on upon all parties and Commission Investigative Attorney, Juan Cockburn, Esq. via first class mail and air mail where necessary on April 14, 2006.

Marilyn R. Abbott, Secretary
U.S. Int'l. Trade Commission
500 E Street, S.W.
Washington, D.C. 20436

COUNSEL FOR COMPLAINANT FLEXSYS AMERICA L.P.:

Gregory C. Dorris, Esq.
Charles H. Carpenter, Esq.
PEPPER HAMILTON LLP
Hamilton Square
600 14th Street, N.W.
Washington, D.C. 20005-2004

Eric C. Cohen, Esq.
Charles R. Krikorian, Esq.
KATTEN MUCHIN ZAVIS ROSENMAN
525 West Madison
Chicago, IL 60661-3693

Gary Ropski, Esq.
Chikiu Chan, Esq.
BRINKS HOFER GILSON & LIONE
NBC Tower
455 North Cityfront Plaza
Suite 3600
Chicago, Illinois 60611

ON BEHALF OF RESPONDENT KOREA KUMHO PETROCHEMICAL CO., LTD.:

Guy W. Chambers, Esq.
Maureen Sheehy, Esq.
TOWNSEND TOWNSEND & CREW
Two Embarcadero Center
Eighth Floor
San Francisco, CA 94111
V. James Adduci II, Esq.
Barbara A. Murphy, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, LLP
1200 17th Street, N.W.
Washington, D.C. 20036

Robert G. Badal, Esq.
Edward J. Slizewski, Esq.
HELLER EHRMAN LLP
333 S. Hope Street
Suite 3900
Los Angelos, CA 90071-3043

Alan H. Blankenheimer, Esq.
HELLER EHRMAN LLP
4350 La Jolla Village Drive – 7th Floor
San Diego, California 92122

CERTIFICATE OF SERVICE
PAGE 2 – 337-TA-533

ON BEHALF OF SOVEREIGN CHEMICAL CO.:

James K. Kearney, Esq.
WOMBLE, CARLYLE SANDRIDGE & RICE LLP
1401 I Street, N.W., 7th Floor
Washington, D.C. 20005

Nanda K. Alapati, Esq.
WOMBLE, CARLYLE SANDRIDGE & RICE LLP
8065 Leesburg Pike, 4th Fl.
Tysons Corner, VA 22182-2738

Scott M. Oldham, Esq.
HAHN LOESER & PARKS LLP
One GOJO Plaza, Suite 300
501 S Main Street
Akron, OH 044311-1076

Deborah A. Coleman, Esq.
HAHN LOESER & PARKS LLP
3300 BP Tower
200 Public Square
Cleveland, OH 44114

ON BEHALF OF SINORGCHEM CO., LTD.:

Paul J. Zegger, Esq.
ARNOLD & PORTER LLP
555 12th Street, N.W.
Washington, D.C. 20004

Shanlon Wu
KING AND WOOD PRC Lawyers
31st Fl., Tower A. Jianwei SOHO,
39 Dongsanhuan Zhonglu
Chaoyang District, Beijing 100022
People's Republic of China

Manni Li, Esq.
VENABLE LLP
575 7th Street, N.W.
Washington, D.C. 20004

Marcia H. Sundeen, Esq.
LAW OFFICES OF Marcia H. Sundeen
1700 Pennsylvania Avenue, NW
Suite 400
Washington, D.C. 20006

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME	Investigation No. 337-TA-533

Final Initial and Recommended Determinations

This is the administrative law judge's Final Initial Determination under Commission rule 210.42. The administrative law judge, after a review of the record developed, finds a violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, by respondents Sinorgchem Co., Shandong and Sovereign Chemical Company. However, he finds no violation of said section 337 by respondent Korea Kumho Petrochemical Co., Ltd.

This is also the administrative law judge's Recommended Determination on remedy and bonding, pursuant to Commission rules 210.36(a) and 210.42(a)(1)(ii). The administrative law judge recommends that the Commission issue limited exclusion orders. He does not recommend any bond be imposed during the Presidential review period.

APPEARANCES

For Complainant Flexsys America L.P.:

Gregory C. Dorris, Esq.
Pepper Hamilton LLP
Hamilton Square
600 14th Street, NW
Washington, DC 20005-2004

Eric C. Cohen, Esq.
Neil Benchell, Esq.
Carolyn. E. Miller, Esq.
Katten Muchin Rosenman
535 West Monroe St.
Chicago, IL 60661-3693

Glen Belvis, Esq.
Brinks, Hofer Gilson & Lione
455 North Cityfront Plaza Drive
Suite 3600
Chicago, IL 60611

For Respondent Sovereign Chemical Company:

James K. Kearney, Esq.
Womble Carlyle Sandridge & Rice LLP
1401 I Street, NW, 7th Floor
Washington, DC 20005

Nanda K. Alapati, Esq.
Womble Carlyle Sandridge & Rice LLP
8065 Leesburg Pike, 4th Floor
Tysons Corner, VA 22182-2738

APPEARANCES cont'd

For Respondent Korea Kumho Petrochemical Co., Ltd.:

V. James Adduci II, Esq.
Maureen F. Browne, Esq.
Barbara A. Murphy, Esq.
Adduci, Mastriani & Schaumberg, LLP
1200 17th Street, N.W.
Washington, DC 20036

Guy W. Chambers, Esq.
William J. Bohler, Esq.
Mark Jansen, Esq.
Maureen Sheehy, Esq.
Angus M. MacDonald, Esq.
J. Jeb B. Oblak, Esq.
Joel G. Ackerman, Esq.
Alexandra M. Sepulveda, Esq.
Townsend and Townsend and Crew LLP
Two Embarcadero Center
8th Floor
San Francisco, California 94111

For Respondent Sinorgchem Co., Ltd.:

Stanton T. Lawrence, III, Esq.
Zhiqiang Zhao, Esq.
Arnold & Porter, LLP
555 12th Street, NW
Washington, DC 20004

Manni Li, Esq.
Venable LLP
575 7th Street, NW
Washington, DC 20004

Marcia H. Sundeen, Esq.
1700 Pennsylvania Avenue, NW
Suite 400
Washington, DC 20006

APPEARANCES cont'd

For Respondent Sinorgchem Co., Ltd. cont'd:

Wang Jiabin, Esq.
Wenping Chen, Esq.
King and Wood PRC Lawyers
31st Floor, Tower A, Jianwei SOHO,
39 Dongsanhuan Zhonglu
Chaoyang District, Beijing 100022
People's Republic of China

For ITC Staff:

Juan Cockburn, Esq.
Jeffrey R. Whieldon, Esq.
Office of Unfair Import Investigation
U.S. International Trade Commission
500 E. Street, SW
Washington, DC 20436

TABLE OF CONTENTS

PAGE

OPINION

ABBREVIATIONS

CBr	Complainant's Post-hearing Brief
CDX	Complainant's Demonstrative Exhibit
CORFF	Complainant's Objection To Respondents' Proposed Finding
COSFF	Complainant's Objection To Staff's Proposed Finding
CFF	Complainant's Proposed Finding
CPX	Complainant's Physical Exhibit
CRRBr	Complainant's Post-hearing Reply Brief to Respondents' Post-hearing Brief
CRSBr	Complainant's Post-hearing Reply Brief to Staff's Post-hearing Brief
CRRFF	Complainant's Rebuttal Finding to Respondents' Proposed Finding
CRSFF	Complainant's Rebuttal Finding To Staff's Proposed Finding
CX	Complainant's Exhibit
FF	Additional Findings Of Fact
JX	Joint Exhibit
RBr	Respondents' Post-hearing Brief
RDX	Respondents' Demonstrative Exhibit
RPX	Respondents' Physical Exhibit
RRBr	Respondents' Post-hearing Reply Brief
RRX	Respondents' Rebuttal Exhibit
ROCFF	Respondents' Objection To Complainant's Proposed Finding
ROSFF	Respondents' Objection To Staff's Proposed Finding
RFF	Respondents' Proposed Finding

RRCFF	Respondents' Rebuttal Finding To Complainant's Proposed Finding
RRSFF	Respondents' Rebuttal Finding To Staff's Proposed Finding
RX	Respondents' Exhibit
SPBr	Staff's Pre-hearing Brief
SBr	Staff's Post-hearing Brief
SFF	Staff's Proposed Finding
SRBr	Staff's Post-hearing Reply Brief
Tr.	Transcript Of Telephone Conference, Pre-hearing Conference And Hearing

I. Procedural History

By notice, which issued on March 23, 2005,[1] the Commission instituted an investigation, pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, to determine whether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation into the United States, or the sale within the United States after importation of certain rubber antidegradants, components thereof, or products containing same by reason of infringement of claims 30 or 61 of U.S. Patent No. 5,117,063, ('063 patent), claims 7 or 11 of U.S. Patent No. 5,608,111 ('111 patent), or claims 1, 32, or 40 of U.S. Patent No. 6,140,538 ('538 patent), and whether an industry in the United States exists as required by subsection (a)(2) of section 337. The complaint was filed with the Commission on February 23, 2005, under section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, on behalf of complainant Flexsys America L.P. (Flexsys), 260 Springside Drive, Akron, Ohio 44334-0444. A supplement to the complaint was filed on March 10, 2005. Complainant, in the complaint, requested that the Commission issue a permanent exclusion order and permanent cease and desist orders.

The following were named in the notice of investigation as respondents and were served with the complaint:

Sinorgchem Co., Shandong (Sinorgchem)
No. 1, Beihuan Road, Caoxian
Shandong, China 274400

Korea Kumho Petrochemical Co., Ltd. (KKPC)
15/16F Kumho-Asiana Building
#57, 1-ga, Shinmun-Ro, Jongro-Gu
Seoul, Korea

---

[1] The Notice of Investigation was published on March 29, 2005 (70 Fed. Reg. 15885).

Sovereign Chemical Company (Sovereign)
341 White Pond Drive
Akron, Ohio 44320

Vilax Corporation (Vilax)
33 Roberts Street
Rockaway, New Jersey 07866

Stolt-Nielsen Transportation Group Ltd. (Stolt-Nielson)
8 Sound Shore Drive
Greenwich, Connecticut 06830

Order No. 3, which issued on April 26, 2005, set a target date of May 29, 2006. Hence the final initial determination on violation should be filed no later than March 1.

Order No. 4, which issued on May 13, 2005, terminated the investigation as to respondent Vilax. The Commission on June 10, determined not to review Order No. 4. Order No. 5, which issued on May 24, terminated the investigation as to respondent Stolt-Nielsen. The Commission on June 13 determined not to review Order No. 5.

Order No. 8, which issued on July 12, 2005, granted KKPC's Motion No. 533-7 to add the affirmative defenses of patent misuse. Order No. 12, which issued on July 25, found complainant's Motion No. 533-9 to disqualify O'Melveny & Myers LLP as co-counsel for KKPC moot.

Order No. 18, which issued on September 1, 2005, was an initial determination granting complainant's Motion No. 533-21 for summary determination dismissing KKPC's affirmative defense of misuse. The Commission determined not to review Order No. 18 on October 5.

Order No. 20, which issued on September 1, 2005, granted Motion No. 533-18 of respondents to add the affirmative defense of unenforceability due to inequitable conduct.

Order No. 21, which issued on September 8, 2005, denied complainant's Motion No.

533-26 to amend the complaint and notice of investigation by adding thirty-two (32) dependent claims which involved allegations of infringement by respondent Sinorgchem.

Order No. 27, which issued on October 7, 2005, was an initial determination granting complainant's Motion No. 533-33 to terminate the investigation as to the '538 patent. The Commission determined not to review Order No. 27 on November 2. Order No. 28, which issued on October 13, granted complainant's Motion No. 533-38 regarding the economic prong of the domestic industry requirement. The Commission on November 1 determined not to review Order No. 28.

Motions filed by the private parties in late October 2005, November and December included the following:

533-50	10/28/05	Complainant's Motion in Limine to Exclude Evidence and Testimony Related to Respondent KKPC's P1 and P2 Process
533-51	10/28/05	Complainant's Motion in Limine to Exclude the Testimony of KKPC's Proposed Expert Jeffrey Winkler
533-52	10/28/05	Complainant's Motion in Limine to Preclude Respondents from Offering Any Exhibits or Testimony Relating to United States Patent No. 6,140,538
533-53	10/28/05	Respondents' Motion in Limine to Preclude Complainant from Asserting Infringement under the Doctrine of Equivalents
533-54	10/28/05	Motion in Limine of Respondents Sinorgchem and KKPC to Preclude Complainant Flexsys from Relying on a New Claim Construction

533-55	10/28/05	Complainant's Motion in Limine to Preclude Respondents from Offering Any Testimony or Exhibits Concerning the Findings of a Foreign Tribunal on the Patentability of Any Foreign Counterpart of the Patents-in-suit
533-56	10/28/05	Complainant's Motion in Limine to Exclude Previously Undisclosed Basis of Noninfringement
533-57	10/28/05	Respondent KKPC's Motion in Limine to Preclude Complainant from Presenting Evidence or Argument That its P1 and P2 Processes for Producing 4-ADPA and 6PPD Infringe U.S. Patent Nos. 5,117,063 and 5,608,111
533-58	10/28/05	Respondents' Motion in Limine to Preclude Roger K. Rains from Testifying as to Any Opinions or as to Any Matters Not Covered in His Pre-hearing Deposition
533-59	10/28/05	Respondents' Motion in Limine to Exclude Opinion Testimony of Donald Fields
533-60	11/4/05	Motion of Complainant for Leave to Supplement its Amended Pre Hearing Statement to Add Information about the Technical Prong of the Domestic Industry
533-61	11/4/05	Motion of Complainant for Leave to Supplement its Amended Pre Hearing Statement to Clarify That it Is Not Alleging That KKPC's P1 and P2 Processes Infringe the '063 and the '111 Patents
533-62	11/15/05	Respondents KKPC, and Sinorgchem's Motion to Strike Testimony Regarding Flexsys' June 8, 2005, Purported Replication of the Wohl (1903) Reaction Between Aniline and Nitrobenzene
533-63	12/2/05	Motion of Complainant to Strike Testimony and Exhibits Regarding Whether KKPC's P1 and P2 Processes Infringe U.S. Patent Nos. 5,117,063 and 5,608,111

533-64	12/16/05	Respondents KKPC and Sinorgchem Motion and Supporting Memorandum for Leave to File a Reply in Support of Motion to Strike Testimony Regarding Flexsys' Purported Replication of the Wohl (1903) Reaction Between Aniline and Nitrobenzene
533-65	12/19/05	Unopposed Motion of Complainant to File its Objections and Rebuttal Findings to Proposed Findings of Fact of Respondents

A pre-hearing conference was conducted on November 7, 2005. At the pre-hearing conference Motion Nos. 533-50 and 533-57 were denied and Motion No. 533-60 was granted. Referring to Motion Nos. 533-50 and 533-57, complainant was given the opportunity to make a standing objection to any testimony or exhibits in evidence relating to KKPC's P1 and P2 processes and to file a motion to strike. (Tr. at 29.) In a telephone conference on November 3, the administrative law judge had denied Motion Nos. 533-51, 533-52, 533-53, 533-54, 533-55 and 533-56. (Tr. at 32, 60, 61.) Thereafter, at the pre-hearing conference, he treated a supplemental brief of respondents in support of their Motion No. 533-53 as a motion for reconsideration of his ruling on Motion No. 533-53 and denied said motion. He also denied Motion No. 533-58. (Tr. at 30, 31, 38.) He further granted Motion No. 533-61. (Tr. at 29, 42.) Motion No. 533-59 was denied to the extent that Fields was permitted to testify based on Field's personal knowledge. (Tr. at 42.) Motion No. 533-65 is granted. Motion Nos. 533-62, 533-63 and 533-64 are treated infra.

The evidentiary hearing commenced on November 7, 2005 and continued on November 8, 9, 10, 14 and 15. All parties participated in the hearing. Post-hearing submissions have been filed.

On February 3, 2006, complainant moved for leave to file a post-hearing sur-reply brief and notification of recent authority. (Motion Docket No. 533-66.) On February 7, respondents opposed said motion. Motion No. 533-66 is granted.

The matter is now ready for a final determination.

The Final Initial and Recommended Determinations herein are based on the record compiled at the hearing and the exhibits admitted into evidence. The administrative law judge has also taken into account his observation of the witnesses who appeared before him during the hearing. Proposed findings of fact submitted by the parties not herein adopted, in the form submitted or in substance, are rejected as either not supported by the evidence or as involving immaterial matters and/or as irrelevant. Certain findings of fact included herein have references to supporting evidence in the record. Such references are intended to serve as guides to the testimony and exhibits supporting the finding of fact. They do not necessarily represent complete summaries of the evidence supporting said findings.

II. Parties

See FF 1-21.

III. Live Witnesses At Hearing

Appearing as live witnesses at the hearing for complainant were Young Ik Choi, James Bashkin, Michael Stern, Roger Rains, Donald L. Fields, David Crich, Jerry Crowley and William Woodyard. Live witnesses for respondents at the hearing were Nongyue Wang, Gregory C. Fu, Sung Kyu Lim, Kee-Woong Park, Jin Eok Kim and Eric J. Beckman.

Choi testified regarding his opinion as to how Korean courts interpret contracts that are subject to Korean law. (Tr. at 153.) Bashkin, a named coinventor on the '063 and '111 patents, is employed by the University of Missouri, Saint Louis and by his own small company Nanovir, LLC which is working on the prevention and cure of cervical cancer. (Tr. at 192-3.) Bashkin received a Ph.D in the field of organometalic chemistry. (Tr. at 193.) In 1985, Bashkin was recruited by Monsanto corporate research. From 1985 to 1988, he was a senior research chemist at Monsanto. (Tr. at 195.) In 1988, Bashkin was promoted to research specialist but shortly thereafter, took an academic position although still employed by Monsanto. (Tr. at 197.) He later left Monsanto to become an assistant professor of chemistry at Washington University. (Tr. at 198.) However, thereafter, Bashkin returned to Monsanto where he remained until 2003. (Tr. at 199; CX-156.) Bashkin was qualified as complainant's expert in chemistry. (Tr. at 204.)

Stern, a named coinventor on the '063 and '111 patents, received a Ph.D in chemistry in 1987. (Tr. at 491, 493.) Stern is presently CEO of Renessen LLC, a joint venture between Monsanto and Cargill that is an agricultural biotechnology company that develops enhanced nutritional grain for the animal feed industry. Prior to becoming CEO of Renessen, Stern had been employed by Monsanto, beginning in December 1988, as a senior research chemist in Monsanto's Corporate Research department (the entry level position for a Ph.D), and progressed to a distinguished science fellow and technology director for the agricultural business and analytics department. (CFF 70 (undisputed).) Rains, a named coninventor on the '111 patent, received his Ph.D in chemical engineering in 1968 and started work at Monsanto a couple of months before he formally received the Ph.D (Tr. at 658.) Fields received a masters degree in 1983 and started employment with Monsanto in 1984 as a research chemist. (Tr. at 809.) In 1995, he became technology process group leader at Flexsys. (Tr. at 813.) Crich graduated in organic chemistry with a Ph.D equivalent in 1984. (Tr. at 876.) Crich was qualified as complainant's expert in chemistry. (Tr. at 880.) Crowley was employed by Monsanto continuously from July of 1972 until September 1, 1997, and had responsibility for Monsanto's holdings in Korea. (Tr. at 2213.) Woodyard is employed by Flexsys and is vice president for commercial services in the Americas. (Tr. at 2288.)

Referring to respondents' live witnesses, Wang is a general manager at Sinorgchem responsible for its production, operation, manufacturing and research and development. (Tr. at 1121.) Fu received a Ph.D in 1991 in the general area of organic chemistry. He was qualified as respondents' expert in the field of organic chemistry. (Tr. at 1286, 1289.) Lim is general manager within respondent KKPC. (Tr. at 1510.) Park was asked to provide expert opinions on Korean law. (Tr. at 1664.) Kim is with the research and development center of KKPC. (Tr. at 1753.) Beckman received a Ph.D. degree in the 1980's. He was qualified as respondents' expert in organic chemistry and chemical engineering. (Tr. at 1863, 1868.)

IV. Technical Background/Patents In Issue

This investigation involves rubber antidegradant chemicals which are used as additives in tires and other rubber products. (Complaint.) Flexsys has asserted infringement of claims from two related process patents, i.e., claims 30 and 61 of the '063 patent and claims 7 and 11 of its continuation-in-part '111 patent. (Complaint ¶¶ 41, 48; CX-1; CX-3.)

On June 21, 1991, U.S. Patent Application Serial No. 719,876 (the '876 application) was filed in the United States Patent & Trademark Office (USPTO). (CX-2.) On May 26, 1992, U.S. Patent No. 5,117,063 (the '063 patent), entitled "Method of Preparing 4-Aminodiphenylamine," was issued by the USPTO to Michael K. Stern and James K. Bashkin. (CX-1.) The '063 patent was originally assigned to Monsanto Company (Monsanto), and was subsequently assigned to

Flexsys in 1995. Flexsys is the owner of all right, title, and interest in the '063 patent. (CX-46.) On March 27, 1992, a continuation-in-part application of the '876 application was filed in the USPTO and given Application Serial No. 157,120 (also filed as PCT/US92/02232) (the '120 application).[2] On May 5, 1995, a continuation application of the '120 application was filed in the USPTO and given Application Serial No. 435,607. On March 4, 1997, U.S. Patent No. 5,608,111 (the '111 patent) was issued by the USPTO to Michael K. Stern, James M. Allman, James K. Bashkin, and Roger K. Rains. The '111 patent has the same title as the '063 patent, viz., "Method of Preparing 4-Amino-diphenylamine." It is assigned to Flexsys, which is the owner of all right, title and interest in the '111 patent. (CX-46.) The '111 patent has the same expiration date as the '063 patent, viz. June 21, 2011. (CX-1; CX-3.) The specification of the '111 patent is substantially identical to the specification for the '063 patent with two exceptions: first, the presence of examples 13-21, and second, the correction of errors in the specification of the '063 patent. (CX-3, col. 14, ln. 38 - col. 19, ln. 1-8, col. 14, ln. 38 - col. 19, ln. 67.)

The '063 and '111 patents relate to the methods of preparing a chemical called 4-ADPA[3] wherein aniline or substituted aniline derivatives is reacted with nitrobenzene in the presence of a base, and under conditions wherein the amount of protic material, e.g. water, is controlled to produce a mixture rich in the salt of 4-nitrodiphenylamine [4] and/or the salt of 4-

---

[2] U.S. Patent No. 5,453,541 issued from the '120 application. (CX-3.)

[3] 4-ADPA is shorthand for 4-aminodiphenylamine, which is also referred to as para-aminodiphenylamine or PADA. (Kim, Tr. at 1761; CX-1, col. 1, ln. 8.)

[4] This 4-ADPA intermediate 4-nitrodiphenylamine is also referred to as 4-NDPA. (CX-1, col. 3, lns. 17-18) (CFF 117) (undisputed).

nitrosodiphenylamine.[5] (CX-1; CX-3.) Thereafter, "[t]he 4-nitrodiphenylamine and/or 4-nitrosodiphenylamine salts are isolated and subsequently hydrogenated [reduced] or, alternatively, the reaction mixture itself is hydrogenated, to produce 4-ADPA in high yield." (CX-1, col. 1, lns. 14-18 (CFF 119 (undisputed).) 4-ADPA is an intermediate chemical compound that is used to produce alkyl para-phenylenediamines, such as 6PPD through reductive alkylation of 4-ADPA. (CX-1, col. 6, lns. 4-15;[6] Rains, Tr. at 664-66; Complaint ¶ 2.) 6PPD, is shorthand for N-(1, 3-dimethylbutyl)-N'-phenyl-p-phenylenediamine. (Crich, Tr. at 887-888; Complaint ¶¶ 2, 19.) 6PPD is commonly used in the manufacture of rubber products, such as tires, belts, hoses, and the like, and functions to prevent premature degradation of the rubber from exposure to sun, heat, ozone and other environmental factors. (Woodyard, Tr. at 2293; Complaint ¶ 19.)

In 1992, the compound 4-ADPA was an important intermediate in Monsanto Chemical Company's (MCC's) Rubber Chemicals Division's family of antioxidants (Santoflex). Thus, in 1991 MCC produced 52 million pounds of 4-ADPA in the United States, Europe and Asia combined. In 1992, the world wide market for 4-ADPA was estimated to be 154 million pounds/year. (CX-30; FA035664.)

With respect to the process for producing 4-ADPA that was being practiced by Monsanto in 1992, in the first step of said process, aniline is reacted with formic acid to form formanilide,

---

[5] This 4-ADPA intermediate 4-nitrosodiphenylamine is also referred to as para-nitrosodiphenylamine or p-NDPA. (Bashkin, Tr. at 264; CX-1, col. 2, ln. 19, col. 3, lns. 2.5.) (CFF 118 (undisputed).)

[6] See step (d) of claim 61 of the '063 patent and step (d) of claim 11 of the '111 patent for the reductive alkylation step.

(FAN). The purpose for that is because FAN is a little easier to deprotonate than aniline itself, and there was a need to deprotonate either aniline or FAN to form the nucleophile that's going to carry out an attack in the next step. The next step of the process involved para-nitrochlorobenzene (PNCB) reacting with FAN in the presence of potassium carbonate base in xylene at 185° C, wherein the base deprotonates the FAN. The FAN forms a Meisenheimer intermediate, as in the known mechanism of nucleophilic aromatic substitution. Then, that intermediate ejects chloride as a leaving group, resulting in potassium chloride and the desired 4-NDPA, plus the by-product, carbon monoxide. Said process is represented by the following reactions:

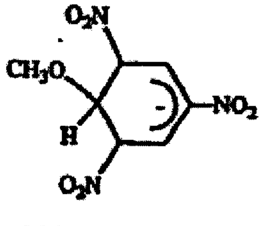
Thereafter, (as shown supra) the nitro group of FAN was reduced under catalytic hydrogenation to an amino group resulting in 4-ADPA. (Tr. at 209-11; CX-30, FA035664.)

The Meisenheimer intermediate (complex) is not shown in the above reactions although it was "assumed" to form because of the mechanistic work in the literature on that type of reaction.[7] (Tr. at 209-10.) Xylene, indicated in the above reactions, is a partial solvent and it is not believed that the potassium carbonate ever went completely in solution. (Tr. at 210.) Xylene is a high boiling solvent which is important because the reaction involving xylene required a high temperature. (Tr. at 210-11.)

The 4-NDPA in the above reactions can be referred to as para-nitrophenylamine. Para

---

[7] The "Meisenheimer complex" is named after a man who was instrumental in discovering it. It's the kind of molecule that has actually been isolated, put in a bottle, and crystal structures have been done on it when multiple nitro groups have been incorporated into the aromatic ring, making the Meisenheimer intermediate more stable. It's sometimes referred to as a sigma complex where a "sigma" bond exists between nitrogen and the carbon in the para position of the nitrobenezene group. It is an isolatable intermediate in the process of substituting generally a chloride with a nucleophile. The compound would be restricted to any aromatic complex of a sigma nature. In other words, where the aromaticity was broken up and two atoms, a chloride typically or a leaving group entity, becoming a nucleophile are bonded to the same carbon of what was formerly the aromatic ring. (Tr. at 224-25.) The Meisenheimer complex is represented by the following formula:



Meisenheimer Complex

(CX-30 at FA035666.)

indicates that two chemical groups are substituted on a benzene-like ring at opposite sides of the ring, so the nitro group and the NH are four carbons apart from each other, or there are two carbons on either side of the ring separating the nitro group from the amine, and that is indicative of para position. The groups next to the nitro group would be considered ortho to the nitro group and also would be considered meta to the amino group. (Tr. at 211-12.) The above reactions show that CO (carbon monoxide) is a byproduct. The reaction involving production of CO, is not as simple as the reaction shows because there are also some organic byproducts that are aromatic amines and nitro derivatives in addition to a large amount of KCL (potassium chloride). Thus, the result was a waste stream that contained a high concentration of chloride salt and some aromatic amines, some of which are known to be carcinogenic or at least are related to molecules that can be carcinogenic, so this was a toxic waste issue. (Tr. at. 212-13.) It's conceivable that there were some organic salts of chlorides as by-products. The bulk of it, however, was potassium chloride, and the chloride was key because it is so corrosive that it would destroy any metal furnace that one might try to use to burn the toxic organic molecules. It would basically burn the metal by oxidizing it. Also in the reaction, there was the release of xylene into the air, which contributed to air pollution. As a solvent that is less desirable because of its health impact than other solvents. (Tr. at 212-14.)

In the last reaction, supra, the nitro group is a highly oxidized form of organic nitrogen, and hydrogen gas acts as a reducing agent in the presence of typically a palladium catalyst, usually palladium on carbon, but there are many, many catalysts in literature. What is generated is water. The oxygen from the nitro group become water, and the nitro group is reduced to its amino analog. (Id.)

The named inventors of the '063 patent, Bashkin and Stern (CX-1), in 1990 were employed in Monsanto's corporate research department. (CFF 56, 57, 70 (all undisputed).) Monsanto's corporate research department was a group of scientists who worked on research projects, some of them in conjunction with Monsanto's business units, including Monsanto's chemical company, agricultural company and pharmaceutical company. (CFF 50 (undisputed).)

Prior to beginning work on the invention covered by the patents-in-suit, Bashkin and Stern had worked on a project using "DNA and RNA" chemistry to work on a new approach to fight disease. (Tr. at 145-7; CFF 71 (undisputed).) When management ended the DNA/RNA project, Bashkin decided to seek an academic position and was granted permission to take the DNA/RNA project with him. (CFF 53 (undisputed).) While looking for an academic position, Bashkin became aware of a memo describing key environmental problems in Monsanto. After reviewing the memo, and having informal discussions with members of Monsanto's rubber chemicals business, Bashkin conducted some preliminary laboratory experiments, and suggested that of three alternative approaches, nucleophilic aromatic substitution appeared to be the most promising. (CFF 56, 57, 59, 60 (undisputed); Tr. at 216; CX FA009144.) After presenting his ideas to Monsanto's Rubber Chemicals business, Bashkin began a number of experiments to test his theory that it was very likely that even if there was no chloride present on the nitrobenzene molecule, it would be possible for an equilibrium to occur in which a Meisenheimer (or "sigma") complex was formed, that could go on to products with a base and an oxidizing agent. (CFF 62, 63, 64, 65 (undisputed); Tr. at 222-24; CX-7 at FA009133.)

CX-5 is a Monsanto memo dated July 9, 1990 on the subject "Project Analysis New Route to 4-ADPA" from Bashkin to Dennis Riley who was Bashkin's immediate supervisor and who reported to the head of Monsanto's corporate research department. (Tr. at 215-16.) The first paragraph of CX-5 refers to three separate approaches to chemistry viz. nucleophilic aromatic substitution, oxidative coupling of aniline and diphenylamine chemistry. Bashkin's recommendation was to begin by pursuing the nucleophilic aromatic substitution (NAS) chemistry. (CX-5 at FA009146.) On NAS, he stated:

> It is well known that the reactivity of nitrobenzene towards electrophilic aromatic substitution is suppressed relative to benzene, and that the nitro group is meta directing, as a consequence of the strong electron-withdrawing properties of the nitro group is meta directing, as a consequence of the strong electron-withdrawing properties of the nitro group. This reactivity difference is the origin of selective mononitration of aromatic rings, since the rate of introduction of a second nitro group is very slow relative to the first nitration.
>
> It is somewhat less-well known that nitration greatly enhances the reactivity of aromatic rings to nucleophilic substitution with a strong para-directing effect. In fact, observation of such chemistry date back to Janovsky in 1886 and Meisenheimer in 1902, but only recently have chemists begun to exploit NAS. Of course, the Monsanto route to 4-nitrodiphenylamine (4-NDPA) employs the nucleophilic substitution of p-chloronitrobenzene PCNB by formanilide anion, where chloride serves as a leaving group. What I recognized about this reaction is that the chloride leaving group may not be necessary, since NAS has been performed on nitrobenzene itself.

(CX-5 at FA009142) (footnotes omitted) (emphasis added).

CX-7 is a set of slides used by Bashkin, and prepared by him, to describe and present on July 30, 1990 the chemistry involved in Bashkin's recommendation to "Roger Raines and his team" at Akron, Ohio. (Tr. at 218, 228.) The second slide under the heading "nucleophilic aromatic substitution" read

> Nitrobenzene is deactivated relative to benzene for electrophilic

> aromatic substitution, but it is activated for nucleophilic aromatic substitution (S_NAr).
>
> The current starting material, p-chloronitrobenzene (PNBC), benefits from this effect: the electron-withdrawing nature of the nitro group leaves a partial positive change on the para position, enhancing the attack by nucleophiles.

(CX-7 at FA009131.) Bashkin defined nucleophile as "usually an anionic, occasionally a neutral species that has a lone pair of electrons that it can donate in the formation of a new bond to, in this case, aromatic, one of the carbons in the aromatic ring." (Tr. at 219-20.) As for the next slide of CX-7 (FA009132) Bashkin testified:

> Q. Could you explain this portion of this next page, the effect of the nitro group on SnAR?
>
> A. Yes. So what we see is, if we draw a Linus Pauling style valence bond structure, we can see that the nitro group with its electro negative oxygen atoms pulls electron density away from the ring, and one of the results of that is that a positive, a partial positive charge develops at the para position, making the para position susceptible to attack by a negatively charged nucleophile or an anion.

(Tr. at 220 (emphasis added).) He testified as to the third slide of CX-7 at FA009133:

> Q. Okay. This next slide talks about the new chemistry. Could you please explain that, especially what you have in the equations?
>
> JUDGE LUCKERN: And, again, for the record, that's FA9133. Go ahead, Doctor.
>
> THE WITNESS: Yes. It occurred to me the reaction we just looked at, which was the reaction of para-nitrochlorobenzene with the nucleophile, involved an equilibrium generation of an intermediate Meisenheimer complex, which went on to products because it had a good chloride leaving group, which was able to, was readily ejected from the Meisenheimer complex, establishing, reestablishing the aromaticity and giving us the desired substitution product.

> But after thinking about this, really, from first principles and writing down what might be the perfect reaction that I wanted to achieve, I came to the conclusion that it was very likely that even if there was no chloride present in the nitrobenzene molecule, it was very possible for an equilibrium to occur in which a Meisenheimer complex was formed of the type drawn on the upper right here, where we have the nucleophile and a hydrogen bonded to the same carbon.
>
> And, again, the negative charge is delocalized out on to the nitro group. Now, this is analogous to the Meisenheimer complex where there is a nucleophile and a chloride bound to the same carbon, but here, we don't have a good leaving group of the type that chloride provides. Hydride would be the analogous leaving group.
>
> Loss at H minus would be equivalent loss of CL minus, and hydride, under most circumstances in organic chemistry, is a very poor leaving group. And so I thought that while this intermediate might occur, it might not go on to products unless it were along the way to assist in removal of this hydride leaving group, and the leaving group didn't have to be removed all at once because hydride is made up of a proton and two electrons, so you can imagine achieving this with a base and an oxidizing agent, and so that was the <u>original concept</u> of the new reaction.

(Tr. at 222-224 (emphasis added).) The fourth slide (CX-7 at FA009134) referred to an 1899 publication by Wohl which Bashkin testified was both encouraging and discouraging because the publication showed that hydroxide in Bashkin's interpretation could act as a nucleophile and replace hydrogen in nitrobenzene without having to chlorinate nitrobenzene prior to the reaction. However, Bashkin testified that the selectivity of the reaction was completely wrong for the desired products; that it gave ortho hydroxynitrobenzene, rather than para-hydroxynitrobenzene, so there was something very wrong about this reaction, and it was not going to be directly useful, but it was at least encouraging that substitution for hydrogen could occur. (Tr. at 226-7.)

After the presentation of Bashkin in July 1990, Monsanto decided to pursue his recommendation "to see if we could make this chemistry work in a useful manner on a laboratory scale, so that it could be considered for the scale - up, ultimately, in the long term." (Tr. at 290.) When Bashkin ran the reactions of aniline and nitrobenzene in the presence of a base in the lab, he initially observed a deep red color formed when the base interacted with nitrobenzene and aniline, and tentatively assigned that to the Meisenheimer complex because Meisenheimer complexes were known to be approximately that color, and he also observed the desired para substitution products in very high yield with very, very low, if any, amounts of ortho substitution products. (Tr. at 230.) Bashkin ran a lot of reactions, but a typical reaction was to use DMSO (dimethyl sulfoxide) as a solvent and to use the 1:1 mole ratio of nitrobenzene to aniline and, initially, an excess of base, and then as Bashkin developed a greater understanding of the chemistry, he cut down on the excessive base and started using a stoichiometric base. (Tr. at 230-31.) Bashkin, to identify products produced by his reactions, ran gas chromatography and some thin layer chromatography and used standards and also worked with Monsanto's analytical department, which had a gas chromatograph mass spectrometer, to confirm that he wasn't being misled by gas chromatography alone, and so he was able to absolutely identify 4-ADPA intermediates produced in the reactions. (Tr. at 231.) As for the base used in said reactions, Bashkin testified:

> Q. Now, when TMAH was used in this reaction, were there any water molecules associated with it?
>
> A. Yes.
>
> Q. And are they shown here?
>
> A. No, they are not.
>
> Q. Okay. Could you explain how the water molecules happen to be on the TMAH?

> A. Well, when TMAH is purchased, it comes as a hydrate, and depending on the source, there will be six to nine waters or more, and if you leave it sitting out on the bench top, it will pick up water from the air, so it's very hygroscopic. However, it can be dried, and under rigorous drying conditions, almost all of the water molecules can be driven off, but the last two cannot.
>
> And so the driest this can be made is to have two mole equivalents of water for every equivalent of hydroxide.
>
> Q. And is that the way that this reaction was carried out?
>
> A. <u>The reaction was carried out initially in the early stages of my work with the wetter forms of TMAH, and then as we began to study the importance of the various reaction parameters, including protic material, temperature, and other things like that, it became clear that the water content or content of other protic material was critical to the success of the reaction</u>. [8]

(Tr. at 237-38 (emphasis added).)

---

[8] Bashkin's live testimony in November 2005 is corroborated by the report of Stern and Bashkin dated March 19, 1992, which was before this investigation was contemplated. Thus, said report stated:

> Our initial studies revealed that the overall yield and relative distribution of these products [intermediates in the production of 4-ADPA] are determined by several reaction variables: 1) <u>the amount of water present</u> 2) whether the reaction is performed under aerobic or anaerobic conditions 3) the ratio of aniline to nitrobenzene and 4) temperature.

(CX-30 at FA 035674 (emphasis added).) Respondents argued that CX-30 was "published" March 12, 1992, several months after the '063 patent was applied for (June 21, 1991) (RRCFF 92). It is a fact however that the work which led to the March 19, 1992 report was commenced at Monsanto in the summer of 1990, <u>and</u> completed prior to March 19, 1992.

Bashkin's yield from his laboratory experiments of 4-ADPA intermediates seemed to be "around 30 percent, 40 percent . . . in my best cases." Said 40 or 30 percent did <u>not</u> include the substance that was red. (Tr. at 232.)

Stern later determined that the red substance was a salt of an intermediate of 4-ADPA. (Tr. at 233.) Bashkin testified as to Stern's work:

> A. It dramatically changed the entire situation because I had been doing gas chromatography, as I said, and gas chromatography is typically a useless mechanism for studying salts because they're not volatile. They don't go into the gas phase, and they simply precipitate in the top of your chromatography column, and you never see any signal from them.
>
> <u>Dr. Stern realized through and did experiments to prove that the red material was not an intermediate in nucleophilic aromatic substitution, but was a deprotonated salt that was an intermediate to forming 4-ADPA, and so he used high performance liquid chromatography, which is excellent at looking at polar and neutral compounds and at salts</u>.
>
> <u>And what we found was that the reaction I had been running all along had a much higher yield of 4-ADPA intermediates than I had realized because my method of analysis was missing all of the large amount of material that was a salt in the reaction mixture</u>.

(Tr. at 233-4 (emphasis added).)

The CX-30 report, which is dated March 19, 1992, is titled "The Direct Coupling Of Aniline And Nitrobenzene: A New Route To 4-ADPA Intermediates," and is authored by Stern and Bashkin.[9] Its abstract read:

---

[9] Bashkin was not employed by Monsanto on March 19, 1992. However, he testified that Stern compiled the March 19, 1992 report (CX-30) based on previous experiments and reports

> The compound 4-ADPA, 4-aminodiphenylamine, is an important component of the MCC Rubber Chemicals family of antioxidants. The current Monsanto process proceeds via a route involving p-chloronitrobenzene which generates a substantial aqueous waste stream that contains inorganic salts and organics. A program has been started, in collaboration with the Rubber Chemicals Division of MCC, aimed at exploring new routes to 4-ADPA which have environmental and economic advantages over the current process. We have discovered that the reaction of aniline, nitrobenzene, and hydroxide generates the salts of 4-nitrodiphenylamine (4-NDPA) and p-nitrosodiphenylamine (4-NODPA), two key intermediates in the production of 4-ADPA, in excellent yields under mild conditions. The mechanism of this novel reaction was probed and several variables which effect both conversion and selectively have been identified. This reaction forms the base of a new process which completely eliminates the chloride waste stream and substantially reduces the raw material cost to 4-ADPA.

(CX-30 at FA035662 (emphasis added).) Page 4 of CX-30 (FA035667) stated that the direct coupling of aniline and nitrobenzene in the absence of a halide activating agent was reported by A. Wohl in 1903 in the publication Chem. Ber., 36 at 4135; and that the major products of the Wohl reaction were "azobenzene, phenazine, and phenazine N-oxide" although a small (< 5%) amount of 4-nitrosodiphenylamine (4-NODPA) was also isolated.[10]

CX-30 under RESULTS AND DISCUSSION states:

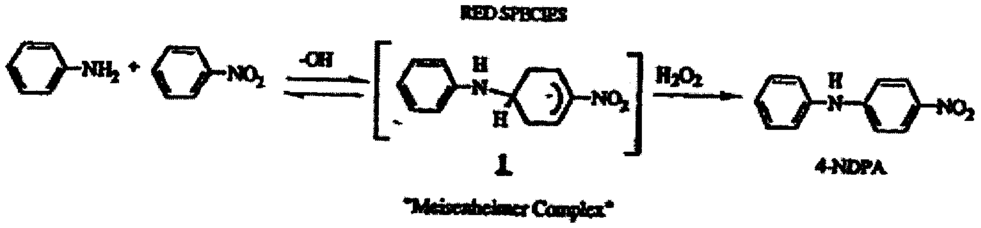
> During initial probe experiments, the reaction of aniline, nitrobenzene and tetramethylammonium hydroxide (TMA(H)) in DMSO was observed to give a deep read solution instantaneously

---

that Bashkin had put together and diagrams that Bashkin had drawn, and coupled those with Stern's own conclusions, experimental results, and diagrams. Stern edited text that Bashkin had already written, wrote new text, and made a new document that had direct contributions from Bashkin, both scientifically and in terms of the figures and writing. Thus, Stern properly acknowledged Bashkin as a co-author even though Bashkin was not at Monsanto at the time and, in fact, did not then see the document. (Tr. at 259.)

[10] Wohl was brought to the Examiner's attention and commented in the prosecution of the patents in issue. See infra Sections VIII 1 and X 2.

> upon mixing. In light of the literature reports on the formation of Meisenheimer complexes, it was originally hypothesized that the red species may be intermediate 1. Furthermore, the addition of aqueous hydrogen peroxide to the reaction resulted in the formation of a small amount of 4-NDPA.



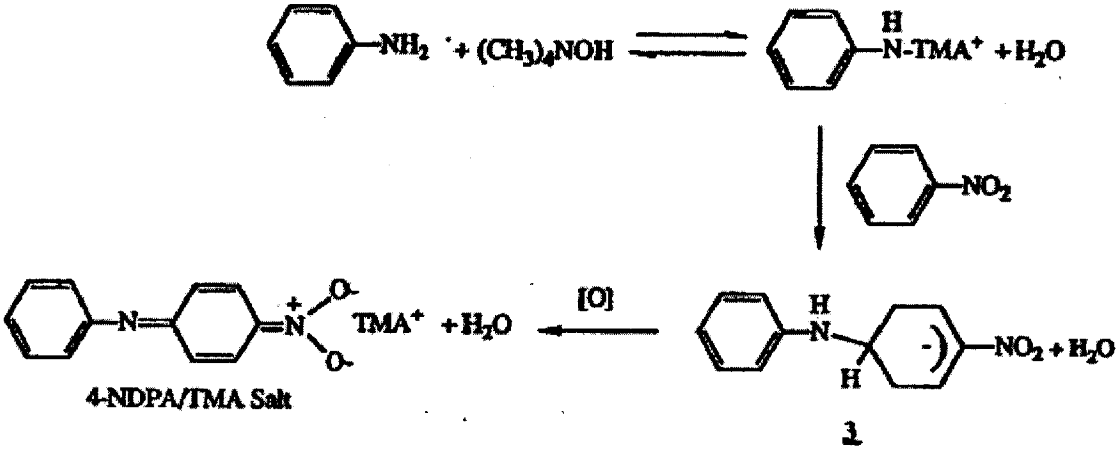
(CX-30 at FA035668-9.) CX-30 later made references to the following Figure 2 which references 4-NDPA/TMA salt 2:

(CX-30 at FA035671.) CX-30 stated that Figure 2 was the visible spectrum of 4-NDPA in DMSO. (CX-30 at FA035672.)

Bashkin in his CX-30 elaborated on the red substance which Stern later determined was a salt of an intermediate of 4-ADPA. Thus, in CX-30, it is stated that in an effort to characterize the red substance, a series of spectrophotometric experiments were initiated (CX-30; FA035669); that from said experiments it was concluded that the red substance generated in the reaction of aniline, nitrobenzene, and base in DMSO is not a Meisenheimer complex, 1 supra but rather, deprotonated 4-NDPA, 2 supra, that consequently, H_2O_2 was not oxidizing 1 but rather protonating 2 resulting in the generation of neutral 4-NDPA; that said experiments conclusively demonstrate that 4-NDPA is formed spontaneously upon the addition of hydroxide to a DMSO solution of aniline and nitrobenzene at room temperature; that it proved possible to isolate the tetramethylammonium salt of 4-NDPA under certain reaction conditions; that the bright red hygroscopic salt could be filtered from the reaction mixture and washed with ether; that the ^{1}H-NMR of this species was distinctly different from the spectra of 4-NDPA; and that the addition of acetic acid-d_4 to the salt resulted in the quantitative conversion to the spectrum of neutral 4-NDPA confirming the conclusions that the 4-NDPA/TMA salt is the products of this reaction. (CX-30; FA035672.)

CX-30 further showed the direct reaction of aniline with nitrobenzene in the presence of the base tetramethyl ammonium hydroxide, and the generation of a set of 4-ADPA intermediates that were formed in fact as deprotonated salts involving the following reaction mechanism:

Scheme 1:



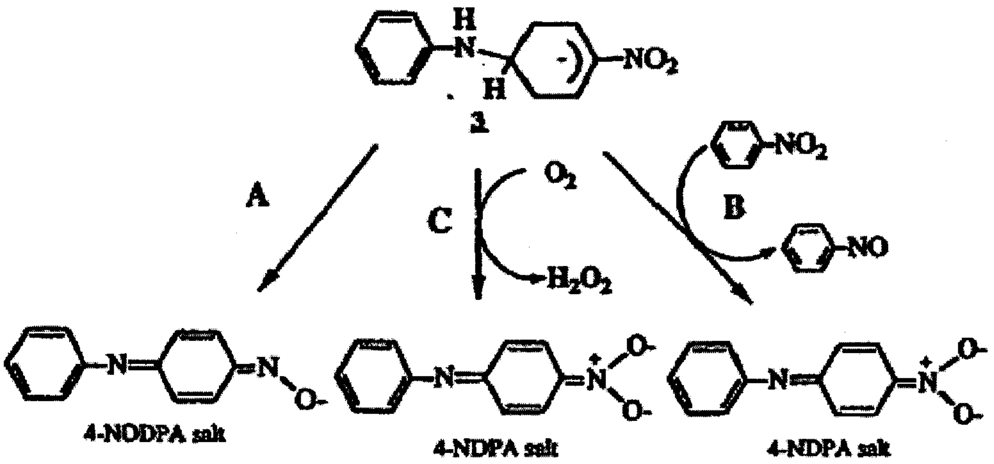
(CX-30; FA035673; Tr. at 236.) As for the above mechanism, Bashkin testified:

> A. Yes, it shows that aniline is deprotonated by the base, forming a molecule of water.
>
> JUDGE LUCKERN: And the base is the tetramethylammonium hydroxide?
>
> THE WITNESS: Yes. And it's really the hydroxide, and the tetramethylammonium group is a counter ion for the hydroxide. So a hydroxide pulls a proton off of aniline forming water, and then we get the tetramethylammonium salt of deprotonated aniline, which is the anionic nucleophile we've talked about off and on. And that nucleophile attacks nitrobenzene at the para position, generating Meisenheimer intermediate.
>
> This is drawn slightly differently from how it's been depicted before, but the chemical meaning is the same. And --
>
> JUDGE LUCKERN: Is this nitrobenzene being added, or is this generating in some way? Is this something that's being added?
>
> THE WITNESS: It's being added, yes, and so then we form a bond between the aniline and the nitrobenzene, and then in the presence of an oxidizing agent, and O in parentheses in general chemical nomenclature means an oxidizing agent unspecified, although it's often specified elsewhere in the text.
>
> It's not specified in this figure. (CX-30; FA035673.)
>
> And the oxidizing agent carries out what I described before, the removal of the two electrons, and we end up here with the salt, the tetramethylammonium salt of 4-nitrodiphenylamine anion.

(Tr. at 238-39.)

CX-30 also set forth the following scheme 3 which was said to contain "a several mechanism for the oxidation of 3 [supra] which are consistent with the observed products and allow for both a nitro and 0_2 based oxidation pathways":

Scheme 3



(CX-30 at FA035679.) It was concluded in CX-30:

> We suggest that the 4-NODPA produced in the reaction results from an intramolecular oxidation (pathway A) where the nitro group of complex, 3, functions are the oxidizing agent. Alternatively, 4-NDPA is produced by an intermolecular oxidation (pathway B) that relies on free nitrobenzene as the oxidant generating nitrosobenzene. The O_2 driven oxidation (pathway C) would also produce 4-NDPA as the product, as well as, hydrogen peroxide.

(CX-30, FA035678-79.) As for the above scheme 3 Bashkin testified:

> Q. And I'm going to move to page 16 of this report, which is FA035679, and I wonder if you could describe that set of reactions shown under the

heading scheme 3?

A. Absolutely. So we talked a couple of times about the importance of an oxidizing agent in this chemistry, and what we discovered is that the nitro group itself, the nitro group and nitrobenzene can act as that necessary oxidizing agent, and the way the chemistry proceeds depends then on several things.

It depends on whether there's a large excess of nitrobenzene, for example, if you brought in the reaction in the nitrobenzene solvent measuring mark or if the reaction is done in air and oxygen is used as the oxidizing agent or if in fact there isn't a large excess of nitrobenzene, and so case A is the case where there is not a large excess of nitrobenzene.

And instead of having many nitrobenzene molecules around in solution to carry out the oxidation, it's the nitro group of the Meisenheimer complex that carries out its own oxidation, so that we end up with 4-nitrosodiphenylamine in the salt form, and so that's an intramolecular redox reaction, where hydride has actually been transferred from the carbon that is bonded to both nitrogen and hydrogen, and it's been transferred to one of the oxygens of the nitro group to form hydroxide.

And then the intermediate case labeled C is where O2 from air is used as the oxidizing agents, and in that case, there's no need for the nitro group to be reduced because it doesn't serve as an oxidizing agent. Oxygen is a stronger oxidizing agent, and so we end up with the 4-nitrodiphenylamine salt as the product.

And I should point out that when oxygen acts as this oxidizing agent, it can act twice because the first time, it's converted to hydrogen peroxide, and hydrogen peroxide itself can act to oxidize another equivalent of the Meisenheimer intermediate to the nitro form.

> And then on the right-hand side, in example B, we see the case where there is a lot of excess nitrobenzene.
>
> And instead of observing the intramolecular hydride transfer to a nitro group, a passing nitro group in solution picks up the hydride from the Meisenheimer intermediate, and that becomes nitrosobenzene and generates a hydroxide ion, and the final product is the 4-NDPA salt.

(Tr. at 240-42 (emphasis added).)

Stern testified, as to scheme 3, <u>supra</u>:

> A. Yes. This was a scheme directed at summarizing our investigations around the oxidation step of the reaction. Again, we still proposed that there was a Meisenheimer complex intermediate which, again, it just wasn't the red species, and we studied a variety of different oxidation conditions, and we summarized that on this diagram.
>
> The key thing here is we found that as you -- path A was a path that, what we called it was the intramolecular path for the oxidation reaction, and that was where the nitro group of the Meisenheimer complex acted as the oxidant, and you resulted in making the 4-nitroso product and water.
>
> In path B, again, a very similar oxidation, but in this case, free nitrobenzene was the oxidant to make nitrosobenzene and water, as well as 4-nitrodiphenylamine, and C was the aerobic pathway that we felt that oxygen also could go ahead and act as an oxidant to form 4-nitrodiphenylamine.
>
> So this was a summary of the different oxidation mechanisms, and, again, we came to this by a whole series of different experiments. A lot of those are highlighted and summarized within this report. Again, we looked at the aniline nitrobenzene ratio and how that affected the product mix. I believe there's a table in here where we looked at the

> effect that temperature had on the aerobic reaction.
>
> JUDGE LUCKERN: So as I understand it, in this, there's really, the 35679 of Exhibit CX-30 really makes reference to a series of reactions, and these reactions, if you want to go into them, they vary with respect to the oxidizing conditions, and depending on the oxidizing conditions, you may get what you've termed path A, or if you do different oxidizing conditions, you may get what you say is path C, and if you do another different oxidizing condition, you may get what is path B, is that how you understand it?
>
> THE WITNESS: That is correct. Correct. <u>These are simultaneous reactions going from that intermediate and what we needed to do and what we did do is optimize -- by understanding these different pathways, we were able to optimize yield and selectivity of the reaction by driving the reaction down the pathway that we would like</u>.
>
> JUDGE LUCKERN: So let me ask you this, is it your testimony when you simultaneously -- so regardless of what oxidizing conditions you use, and don't speculate, but you would get each of the salt, the 4-NODPA salt or the 4-NDPA salt or the 4-ADPA salt, they would be all formed, but depending on the amount would depend upon the oxidizing conditions? Do you understand what I'm saying?
>
> THE WITNESS: Yes, and that is correct.

(Tr. at 525-27 (emphasis added).)

Stern, as to experiments conducted demonstrating effect of temperature in the aerobic reaction of aniline and nitrobenzene, testified:

> A. Yes, and so what was important about this series of experiments was that, again, it demonstrated as an example that, hey, temperature did have an effect on

> the conversion and selectivity, but more importantly, this was done under aerobic conditions, so this was done in the presence of oxygen.
>
> And what you saw is, as you raise the temperature and you got to higher conversions and higher yields of the desired product, which were the four substituted products, you also began to elevate the levels of azobenzene, and azobenzene was an undesired by-product, and we determined through a series of experiments that this azobenzene was coming from the fact that you could form azobenzene directly by the reaction of aniline in the presence of oxygen in base under elevated reaction, under elevated temperatures.
>
> <u>And so that azobenzene, again, was a nondesired by-product. We understood where it came from, so that told us that we did not want to run this reaction at least under the, under conditions of optimizing it in the presence of oxygen. So that drove us to run the reaction under anaerobic conditions and begin to study the mechanism and how it optimized the chemistry under anaerobic conditions</u>.

(Tr. at 528-29, CX-30 at FA035680 (emphasis added).)

As to experiments reacting aniline and nitrobenzene and referring to scheme 4 <u>infra</u>, Stern testified:

A. Yes. So under anaerobic conditions, there were two pathways, pathway A and pathway B, and the key for us, if our mechanism was in fact correct, is that we wanted to drive this chemistry down pathway A because pathway A made only one -- predominantly made one intermediate of 4-ADPA in this case, the 4-nitroso salt, while if you went down pathway B, by definition, by what's proposed in this mechanism, you would have to form equal amounts of 4-nitrodiphenylamine and azobenzene.

And so through the reaction mechanism that are proposed here and through the experiments that we conducted, we determined that the controlling factor of whether or not you sent this reaction down path A or path B was the amount of nitrobenzene in solution at any one time.

And that has a very clear -- and we determined this chemical kinetic rationalization in that going from intermediate 3 on this diagram, which is the proposed Meisenheimer complex, to 4-nitrosodiphenylamine salt, that in chemical kinetic terms is zero order in nitrobenzene, so free nitrobenzene does not play a role in the rate of that equation. It's not in the chemical equation.

But in pathway B, in order for that oxidation to occur, free nitrobenzene in fact is essential. It is the oxidizing agent. So if you increase the concentration of nitrobenzene in solution, free nitrobenzene, you would increase the rate of pathway B, while pathway A would stay constant, the rate of pathway A would stay constant because it's independent of free nitrobenzene.

So it was clear to us what you wanted to do to drive this reaction down to the highest selectivity possible, which would be down path A, is that you had to control the steady state concentration of nitrobenzene in solution, hence we would either have a large aniline to nitrobenzene ratio, so the steady state concentration of nitrobenzene was very low.

Or you could go ahead and add nitrobenzene slowly over time, and in fact, that's exactly what we were able to do. And if you look at the products, you do make 4-NDPA and azobenzene equal amounts.

Q. That's under pathway B?

A. B, right, if you have a lot of nitrobenzene in there. So we were really able, by understanding the mechanism here simply on the oxidation side, we were able to go ahead and drive this reaction to high conversion and high selectivity. Now, what's not shown on this particular diagram, because we were focusing on, in this case, in summarizing this, we were focusing on the oxidation reaction, is that water is being formed in this reaction, okay, so when you go through this reaction, you are actually generating water, okay, in a number of different spots.

And so, you know, we spent an awful lot of time probing the effect of protic material, in this particular case, water, on this reaction, and as the reaction proceeds, you actually generate more water, and we knew that it was a double-edged sword with water, or protic material, in this case, we'll talk about water, in that if you had too much water, you would significantly inhibit the reaction.

But if you had too little water, you would significantly change the selectivity away from the desired products. So it was complicated by the fact that the reaction generated water.

JUDGE LUCKERN: When you say the reaction generated water, you're talking about whether you go pathway A or pathway B?

THE WITNESS: Right.

JUDGE LUCKERN: 35682 of CX-30, the reaction shown there.

THE WITNESS: Yes.

JUDGE LUCKERN: And both pathway A and pathway B, you generate water?

THE WITNESS: Yes. So you generate water in the formation of the salts, okay?

So --

JUDGE LUCKERN: When you say, "formation of the salts" --

THE WITNESS: So if you took the neutral molecule 4-nitrodiphenylamine, there's a proton on the nitrogen between the phenylamines. That actually gets deprotonated by base, so hydroxide reacts with that to generate water and the corresponding salt of the 4-nitro or 4-nitrodiphenylamine, so for every molecule of the salt of 4-NDPA or 4-NODPA, you generate a molecule of water. The same thing occurs when you generate azobenzene.

Azobenzene is a condensation reaction between aniline and the nitrosobenzene, and that generates a mole of water in equal amounts, so as this reaction proceeds, you actually are generating water, and so you need to control the amount of water in the reaction mixture in fact to get this to go to high yield, high selectivity.

JUDGE LUCKERN: And, again, why do you have to control the water?

THE WITNESS: <u>Because if you let the water build up to a certain degree, continue to build up the rate and the extent of conversion of the reaction slows down, so ideally, what you want to do is drive this reaction to high conversion and high selectivity</u>. Again, we're trying to make a commercial process here.

So the higher amount, the more efficiently we use our reagents, the better off we're going to be, and so in the process of generating the products, you're

> making water, and so you have to remove water, and it took an awful lot of research for us to optimize this chemistry around controlling the amount of protic material.

(Tr. at 529-534; CX-30 at FAO35682 (emphasis added).)

Respondents, citing Atlas Powder Co. v. IRECO Inc. 190 F.3d 1342, 1347 (Fed. Cir. 1999) (Ireco), argued that the mechanism of a reaction is not relevant. (ROCFF 96.) In Ireco the Court concluded that "[i]nsufficient prior understanding of the inherent properties of a known composition does not defeat a finding of anticipation" Id. 190 F.3d 1347. The administrative law judge is not relying on CX-30 and testimony on CX-30 for any anticipation. Rather he references that testimony and CX-30 to show the considerations in the development of the process in issue at Monsanto which complainant has argued led to the alleged method in support of the technical prong of the domestic industry requirement, and which method the administrative law judge has found satisfies the technical prong requirement. See supra Section XI 1.

Stern gave a presentation in 1991 to senior management of Monsanto's Rubber Chemicals business how to optimize the reaction of aniline and nitrobenzene, based on the work of Bashkin and Stern (CX-301). (Tr. at 561-64.) Monsanto, after the presentation, decided to spend 15 million dollars to build and operate a pilot plant, for producing 4-ADPA by the new process which was essentially "a large research facility that allowed us to prove, from a commercial design perspective . . . how would we best build a commercial facility and also test out some very critical experimental things we needed to understand." (Tr. at 567.) According to Stern, [t]here was a large list of research topics that we needed to focus on and fine-tune for the pilot plant." (Id.)

In 1994, the inventors Bashkin and Stern received Monsanto's Thomas and Hochwalt Science and Technology award, which is the highest technical award given for fundamental science by Monsanto. (Tr. at 645-46, CX-45) In 1998, the inventors received the Presidential Green Chemistry Challenge Award. (Tr. at 646-47; CX-47.) The award noted that the new process generated "74 percent less organic waste, 99 percent less inorganic waste, [and] 97 percent less waste water," a potential saving of millions of pounds of waste per year. (Id.)

Flexsys began design and construction of a plant in Antwerp, Belgium to practice the process covered by the patents-in-issue in 1996 and 1997. (CFF 110 (undisputed).) Eighty million dollars was spent by Flexsys to construct the Antwerp plant. (CFF 115 (undisputed).) Start-up difficulties, however, were experienced and thus Flexsys did not begin to ship product out of its Antwerp plant until the third quarter of 1998. (Tr. at 2295-97.) While the Antwerp plant was under construction, Flexsys informed at least certain customers that it would have a new source for production of 4-ADPA, but Flexsys did not give a commitment to any customer that it would sell 6PPD made from 4-ADPA produced by the Antwerp plant. (Tr. at 2295-97.)

V. Jurisdiction

Stipulations in the record state that (1) Sinorgchem has sold for importation into the United States to respondent Sovereign (a) 6PPD which Sinorgchem owned and produced at its plant in China from 4-ADPA and (b) 6PPD that Sinorgchem owned and produced at its plant in China from blends of 4-ADPA comprising 4-ADPA produced at its plant and 4-ADPA purchased by Sinorgchem from third parties; (2) Sinorgchem has sold 4-ADPA to KKPC that Sinorgchem owned and produced at its plant in China including (a) 4-ADPA that Sinorgchem produced at its plant and (b) blends of 4-ADPA comprising 4-ADPA that Sinorgchem produced at its plant and 4-

ADPA purchased from third parties (SX-3); (3) KKPC has sold for importation into the United States 6PPD it owns and produced at its plant in Korea using 4-ADPA purchased from Sinorgchem in China (SX-4); and (4) Sovereign has imported into the United States and sold within the United States after importation 6PPD purchased from Sinorgchem. (SX-5.) Hence the Commission has subject matter jurisdiction. Also all of the respondents appeared in the investigation through counsel. Thus, the Commission has in personam jurisdiction.

VI. Claims In Issue

In issue are claims 30 and 61 of the '063 patent. Claim 30 reads:

> A method of producing 4-aminodiphenylamine (4-ADPA) comprising the steps of:
>
> a) bringing aniline and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates; and
>
> c) reducing the 4-ADPA intermediates under conditions which produce 4-ADPA.

(CX-1, col. 14, lns. 17-26 (emphasis added).) Claim 61 reads as follows:

> A method of producing alkylated p-phenylenediamines comprising the steps of:
>
> a) bringing aniline and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates.
>
> c) reducing the 4-ADPA intermediates to produce 4-ADPA; and
>
> d) reductively alkylating the 4-ADPA of Step c).

(CX-1, col. 15, lns. 34-46 (emphasis added).)

Also in issue are claims 7 and 11 of the '111 patent. Claim 7 reads:

> A method of producing 4-aminodiphenylamine (4-ADPA) or substituted derivatives thereof comprising:
>
> > a) bringing aniline or substituted aniline derivatives and nitrobenzene into reactive contact in a suitable solvent system;
> >
> > b) reacting the aniline or substituted aniline derivatives and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates; and
> >
> > c) reducing the 4-ADPA intermediates under conditions which produce 4-ADPA or substituted derivatives thereof wherein the amount of protic material in step (b) is controlled by the continuous distillation of said protic material.

(CX-3, col. 20, ln 63 – col. 21, ln. 11 (emphasis added).) Claim 11 reads:

> A method of producing alkylated p-phenylenediamines or substituted derivatives thereof comprising:
>
> a) bringing aniline or substituted aniline derivatives and nitrobenzene into reactive contact in a suitable solvent system;
>
> b) reacting the aniline or substituted aniline derivatives and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates;
>
> c) reducing the 4-ADPA intermediates to produce 4-ADPA or substituted derivatives thereof; and
>
> d) reductively alkylating the 4-ADPA or substituted derivatives thereof of step (c) wherein the amount of protic material in step (b) is controlled by the continuous distillation of said protic material.

(CX-3, col. 21, lines 37-53 (emphasis added).) The parties have put in issue for claim interpretation the claimed phrases, as emphasized supra, "controlled amount of protic material" (CBr at 35-58; RBr at 23-40; SBr at 9) and "suitable solvent system." (CBr at 58; RRCFF 358.)

VII. Level Of One Of Ordinary Skill In The Art

Complainant argued that one of ordinary skill in the art is one who practices the art of making 4-ADPA or similar rubber chemical additives, has an associates degree or masters degree and experience in the field, e.g., at least five years of experience. (CFF 482.)

Respondents argued that a person of ordinary skill in the art in the field of the '063 and '111 patents in 1990, would have been a person with at least a Master of Science degree in organic chemistry or chemical engineering, and some years of industrial/academic research experience or a Ph.D. with a focus in organic chemistry or chemical engineering and related research. (RRCFF 432D).

The staff argued that one of ordinary skill in the art in the field of invention could be one with a masters degree in organic chemistry, possibly chemical engineering, with a few years at least of practical laboratory experience beyond that, or one with a Ph.D. in organic chemistry or chemical engineering where that Ph.D. was based on experimental lab work or one with a masters in either chemistry or chemical engineering, with some relevant industrial experience, or a Doctorate in either of the two disciplines. (SFF 41.)

All parties are in agreement that a person of ordinary skill in the art in the field of the '063 and '111 patents in 1990 would have a masters degree or equivalent and the administrative law judge so finds. Moreover in view of technology in issue he further finds that such a person should have at least a masters degree in organic chemistry and some experience in the art of making 4-ADPA in view of the "Related Art" sections set forth in the '063 and '111 patents. (CX-1; CX-3.) Morever the person of ordinary skill in the art is a hypothetical person who is presumed to be aware of all pertinent prior art. See Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc., 807

F.2d 955, 962 (Fed. Cir. 1986).

VIII. Claim Interpretation

Claim interpretation is a question of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370 (1996); see Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1455 (Fed. Cir. 1998). In construing claims, the court should first look to intrinsic evidence consisting of the language of the claims, the specification and the prosecution history as it "is the most significant source of the legally operative meaning of disputed claim language." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996); see Bell Atl. Network Servs., Inc. v. Covad Comm. Group, Inc., 262 F.3d 1258, 1267 (Fed. Cir. 2001).

The claims themselves "provide substantial guidance as to the meaning of particular claim terms." Phillips v. AWH Corporation 415 F.3d 1303, 1314 (Fed. Cir. 2005), citing Vitronics, 90 F.3d at 1582. It is essential to consider the claim as whole when construing each term, because the context in which a term is used in a claim "can be highly instructive." Id. This requirement is consistent with the Federal Circuit's guidance that a claim term can only be understood "with a full understanding of what the inventors actually invented and intended to envelop with the claim." Phillips, 415 F.3d at 1316, citing Renishaw PLC v. Marposs Societá per Azioni,158 F.3d 1243, 1250 (Fed. Cir. 1998). Claim terms "are generally given their ordinary and accustomed meaning." Vitronics, 90 F.3d at 1582.

In Pause Technology, Inc. v. TIVD, Inc. 419 F.3d 1326 (Fed. Cir. 2005) the Court stated:

> . . . in clarifying the meaning of claim terms, courts are free to use words that do not appear in the claim so long as "the resulting claim interpretation . . . accord[s] with the words chosen by the patentee to

> stake out the boundary of the claimed property." Cf. Renishaw PLC v. Marposs Societá per Azioni, 158 F.3d 1243, 1248 (Fed. Cir. 1998) (noting that "[w]ithout any claim term susceptible to clarification . . . there is no legitimate way to narrow the property right").

Id. 419 F.3d at 1333. Also claim terms are presumed to be used consistently throughout the patent, such that the usage of the term in one claim can often illuminate the meaning of the same term in other claims. Research Plastics, Inc. v. Federal Packaging Corp. 421 F.3d 1290, 1295 (Fed. Cir. 2005).

The ordinary meaning of a claim term may be determined by reviewing a variety of sources, which may include the claims themselves, dictionaries and treatises, and the written description, the drawings and the prosecution history. Ferguson Beauregard/Logic Controls v. Mega Sys., LLC, 350 F.3d 1327, 1338 (Fed. Cir. 2003). However the use of a dictionary may extend patent protection beyond what should properly be afforded by a patent. Also there is no guarantee that a term is used in the same way in a treatise as it would be by a patentee. Phillips 415 F.3d at 1322. Moreover, the presumption of ordinary meaning will be "rebutted if the inventor has disavowed or disclaimed scope of coverage, by using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope." ACTV, Inc. v. Walt Disney Co., 346 F.3d 1082, 1091 (Fed. Cir. 2003). In Terlap v. Brinkmann Corp. 418F.3d 1379, 1384 (Fed. Cir. 2005), the Court concluded that the district court "attached appropriate weight" to the dictionary definitions in the context of the intrinsic evidence in reaching its construction of a claim term "clear."

The presence of a specific limitation in a dependent claim raises a presumption that the limitation is not present in the independent claim. Phillips, 415 F.3d at 1315. This presumption is especially strong when the only difference between the independent and dependant claims is the limitation in dispute. SunRace Roots Enter. Co., Ltd v. SRAM Corp., 336 F.3d 1298, 1303 (Fed. Cir. 2003). Differences between the claims are helpful in understanding the meaning of claim terms. Phillips, 415 F.3d at 1314. "[W]here the limitation that is sought to be 'read into' an independent claim already appears in a dependent claim, the doctrine of claim differentiation is at its strongest." Liebel – Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 910 (Fed. Cir. 2004). An independent claim usually covers a scope "broader than the preferred embodiment, especially if the dependent claims recite the precise scope of the preferred embodiment." RF Delaware v. Pacific Keystone Tech., 326 F.3d 1255, 1264 (Fed. Cir. 2003).

The specification of a patent "acts as a dictionary" both "when it expressly defines terms used in the claims" and "when it defines terms by implication." Vitronics, 90 F.3d at 1582. For example, the specification "may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents." Phillips, 415 F.3d at 1323, quoting Iredto Access, Inc. v. Echostar Satellite Corp., 383 F.3d 1295, 1300 (Fed. Cir. 2004). Importantly, "the person of ordinary skill in the art is deemed to read the claim term not only in context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." Phillips, 415 F.3d at 1314. The Federal Circuit has explained that "although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments." Phillips, 415 F.3d at 1323.

The prosecution history, including "the prior art cited," is "part of the 'intrinsic evidence.'" Phillips, 415 F3d at 1317. The prosecution history "provides evidence of how the inventor and the PTO understood the patent." Id. Thus the prosecution history can often inform the meaning of the claim language by demonstrating how an inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be. Vitronics, 90 F.3d at 1582-83; see also Chimi v. PPG Indus., Inc., 402 F.3d 1371, 1384 (Fed. Cir. 2005) ("The purpose of consulting the prosecution history in construing a claim is to exclude any interpretation that was disclaimed during prosecution"), quoting ZMI Corp. v. Cardiac Resuscitator Corp., 844 F.2d 1576, 1580 (Fed. Cir. 1988); Southwall Techs., Inc. v. Cardinal IG Co., F.3d 1570, 1576 (Fed. Cir. 1995). The prosecution history includes any reexamination of the patent. Intermatic Inc. v. Lamson & Sessions Co., 273 F.3d 1355, 1367 (Fed. Cir. 2001).

In addition to the intrinsic evidence, the administrative law judge may, but need not, consider extrinsic evidence when interpreting the claims. Extrinsic evidence consists of all evidence external to the patent and the prosecution history, including inventor testimony and expert testimony. This extrinsic evidence may be helpful in explaining scientific principles, the meaning of technical terms, and terms of art. See Vitronics Corp., 90 F.3d at 1583; Markman, 52 F.3d at 980. However, "[e]xtrinsic evidence is to be used for the court's understanding of the patent, not for the purpose of varying or contradicting the terms of the claims." Markman, 52 F.3d at 981. Moreover, the Federal Circuit has viewed extrinsic evidence in general as less reliable than the patent and its prosecution history in determining how to read claim terms. Phillips, 415 F.3d at 1318. Also, while extrinsic evidence may be useful, it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence. Phillips, 415 F.3d at 1319. However, in Tap Pharmaceutical Products, Inc. v. Owl Pharmaceuticals, LLC 419 F.3d 1346 (Fed. Cir. 2005), the Court concluded that:

> In light of the two different possible meanings for the term "containing," it was entirely reasonable for the district court to look to the specification as well as extrinsic evidence to determine the manner in which the term was used in three patents at issue.

Id. 419 F.3d at 1354. In Nystrom v. Trex Company 424 F.3d 1136 (Fed. Cir. 2005), the Court stated:

> . . . as explained in Phillips, Nystrom is not entitled to a claim construction divorced from the context of the written description and prosecution history. The written description and prosecution history consistently use the term "board" to refer to wood decking materials cut from a log. Nystrom argues repeatedly that there is no disavowal of scope of the written description or prosecution history. Nystrom's argument is misplaced. Phillips, 415 F.3d at 1321 ("The problem is that if the district court starts with the broad dictionary definition in every case and fails to fully appreciate how the specification implicitly limits that definition, the error will systematically cause the construction of the claim to be unduly expansive."). What Phillips now counsels is that in the absence of something in the written description and/or prosecution history to provide explicit or implicit notice to the public– i.e., those of ordinary skill in the art– that the inventor intended a disputed term to cover more than the ordinary and customary meaning revealed by the context of the intrinsic record, it is improper to read the term to encompass a broader definition simply because it may be found in a dictionary, treatise, or other extrinsic source. Id.

Id. 424 F.3d at 1144, 1145. In Free Motion Fitness Inc. v. Cybex International, Inc. 423 F.3d 1343 (Fed. Cir. 2005), the Court concluded that:

> "under Phillips, the rule that 'a court will give a claim term the full range of its ordinary meaning', Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1342 (Fed.Cir. 2001), does not mean that the term will presumptively receive its broadest dictionary definition or the aggregate of multiple dictionary definitions. Phillips, 415 F.3d at 1320- 1322. Rather, in those circumstances, where references to dictionaries is appropriate, the task is to scrutinize the intrinsic evidence in order to determine the most appropriate definition

423 F.3d at 1348,49. In Network Commerce, Inc. v. Microsoft Corp. 422 F.3d 1353 (Fed. Cir.

2005), the Court concluded:

> As we recently reaffirmed in Phillips, "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court." Phillips, 415 F.3d at 1318. Here [expert] Coombs does not support his conclusion [the "download component" need not contain the boot program] with any references to industry publications or other independent sources. Moreover, expert testimony at odds with the intrinsic evidence must be disregarded. Id. ("[A] court should discount any expert testimony that is clearly at odds with the claim construction mandated by . . . the written record of the patent." (internal quotations and citation omitted). That is the case here.

Id., at 1361.

Patent claims should be construed so as to maintain their validity. However, that maxim is limited to cases in which a court concludes, after applying all the available tools of claim construction, that the claim is still ambiguous. Phillips, 415 F.3d at 1327. If the only reasonable interpretation renders the claim invalid, then the claim should be found invalid. See, e.g., Rhine v. Casio, Inc., 183 F.3d 1342, 1345 (Fed. Cir. 1999).

1. The Claimed Term "Controlled Amount Of Protic Material"

Complainant argued that the claimed phrase "controlled amount of protic material" in the asserted claims of the '063 and '111 patents means that the amount of protic material should be controlled between an upper limit and a lower limit. It is argued that the upper limit for the controlled amount of protic material is that amount beyond which the reaction between nitrobenzene and aniline is inhibited. Complainant argued that the lower limit for the controlled amount of protic material is that amount below which the desired selectivity for 4-ADPA intermediates is not maintained. (CBr at 35.)

Respondents argued that "controlled amount of protic material" in the asserted claims of the '063 and '111 patents means about 4% water or less when aniline is the solvent in the reaction and that the patents disavowed any claim construction that encompasses the use of aniline as the solvent and more than about 4% water. (RBr at 23.) However, they argued that they do not urge a construction of the asserted claims that would require the solvent system to be aniline and the protic material to be water. (RRBr at 10.)

The staff argued that the claimed phrase "controlled amount of protic material" in the asserted claims of the '063 and '111 patents should be construed as "limited to a maximum of 4% when aniline is the solvent and TMAH is the base." (RBr at 9.)[11]

The claimed term "controlled amount of protic material" is found in each of the asserted claims of the '063 patent and the '111 patent and all of the parties argued that the same construction should govern the asserted claims of the '063 patent and the '111 patent. Each of the asserted claims involve at least "bringing aniline and nitrobenzene into reactive contact in a suitable solvent system." Each of the proposed constructions of the parties require the presence of aniline. The claimed term in issue further recites "protic material." As seen supra, the asserted claims do not specify what specifically the protic material is and complainant's construction does not require that the claimed protic material be water. Respondents however argued, as to the term in issue, that the protic material should be limited to water when aniline is the solvent while the staff argued that the protic material not only should be limited to water when aniline is the solvent but also that in such instance TMAH (tetramethylammonium hydroxide) should be the base. (SBr at 9.)

---

[11] Presumably the staff intends "TMAH" to refer to tetramethylammonuim hydroxide which is referenced at CX-1, col. 4, lns. 39-40, 58-60.

It would appear that each of respondents and the staff want the administrative law judge to construe "controlled amount of protic material" only with reference to the accused process.{ }

{

}[12]

Respondents, relying on Rheox, Inc. v. Entact, Inc., 276 F.3d 1319, 1324-25 (Fed. Cir. 2002 (Rheox), argued that it is true that, rather than being a "global" claim construction,[13]

---

[12] Each of respondents and the staff, relying on their proposed claim construction for "controlled amount of protic material" in each of the asserted claims, have argued that complainant has not sustained its burden in establishing infringement because{ } { } See infra Section IX 2.

[13] Respondents have cited no case authority for the use of the term "global" claim construction. It appears that the term was coined by respondents for this investigation.

respondents' claim construction is directed only to the "particular issues in this case, *i.e.*, aniline as the solvent and water as the protic material;" that for solvents other than aniline and DMSO, as well as protic material other than water, the '063 and '111 patents are far less clear about how a "controlled amount of protic material" should be defined; that since the patents in issue are "very explicit" about how a "controlled amount of protic material" should be defined for aniline as the solvent and water as the protic material, "there is no need to agonize over formatting a 'global' claim construction to correctly decide the case." (RRBr at 2.)

Construction of a claim, a question of law, is necessary to define the metes and bounds of the protection afforded by the claims. *See* *Palumbo v. Don-Joy Co.*, 762 F.2d 969, 974 (Fed. Cir. 1985) where the Court stated:

> The infringement inquiry is broken down into two steps: first, the scope of the claims must be ascertained, and *then* the trier must decide whether the claims cover the accused device.

(emphasis added.) It is only *after* the scope of the claims is ascertained that the trier must decide an infringement issue.

The administrative law judge does not find that *Rheox* supports the conclusion that "controlled amount of protic material" should be construed only when water is the protic material and aniline is the solvent in the reaction. In *Rheox*, the plaintiff appealed from the district court's grant of summary judgment of non-infringement. Rheox asserted that the district court incorrectly construed the claim term "calcium orthophosphate" to be limited to tricalcium orthophosphate (Ca3(PO4)2) and improperly determined that Rheox disclaimed monocalcium orthophosphate (Ca(H2P04)2H2O) and triple superphosphate (TSP) (which the parties' agreed consisted mostly of monocalcium orthophosphate, Ca(H2PO4)2 H2O) from the scope of its claims. (276 F.3d at

1320-21.)

The Court, in affirming the district court concluded:

> when Rheox distinguished the present invention [in the procecution] based on its "water-insolubility," it was arguing around the examiner's comments and limiting itself to claims not encompassing monocalcium orthophosphate and TSP. Indeed, it stated that the covered compounds were thousands of times less soluble than the soluble compounds of the O'Hara patent, but TSP, with a solubility of 1.8g/100mL water, is not even three times less soluble than O'Hara's disclosed solubility of 5.0g/100mL water.

(Id. at 1326-27.) In Rheox, the claims in issue specifically recited the term "calcium othophosphate" and the Court found that Rheox was estopped from having that term encompass monocalcuim orthophosphate and TSP. In contrast, the asserted claims do not specify water as the protic material. Rather the asserted claims merely state "controlled amount of protic material" and the claimed word "controlled" relates merely to "protic material." While the district court in Rheox found the claim term "calcium orthophosphate" limited to tricalcium orthophosphate respondents do not argue that the claimed protic material should be limited to water and the solvent limited to aniline. To the contrary, respondents have argued that the claims in issue should not require the solvent system to be aniline and the protic material to be water. (RRBr at 10.) While it may be impossible sometimes to frame a claim interpretation issue without reference to the accused infringement, in view of the claims and specifications of the patents in issue, the administrative law judge finds that the claim interpretation issue can be undertaken without first examining the accused infringement and comparing it to the asserted claims. Hence, the administrative law judge will follow the fundamental rule of claim construction, viz., that the claims in issue should be construed without reference to the accused process. As the Court stated in SRI Int'l v. Matsushita Elec. Corp. Of Am., 775 F.2d 1107, 1118:

> A claim is construed in the light of the claim language, the other claims, the prior art, the prosecution history, and the specification, not in light of the accused device. Contrary to what MEI's counsel wrote the district court, claims are not construed "to cover" or "not to cover the accused device. That procedure would make infringement a matter of judicial whim. It is only after the claims have been construed without reference to the accused device that the claims, as so construed, are applied to the accused device to determine infringement. See, Palumbo v. Don-Joy Co., 762 F.2d at 974, 226 USPQ at 8.

(emphasis in original.) See also NeoMagic Corp. v. Trident Microsystems, Inc., 287 F.3d 1062, 1074 (Fed. Cir. 2002) where the Court stated:

> NeoMagic argues, and we agree, that the court arrived at the constant voltage definition by examining the BIAS line of the accused device and, in effect, construing the claims to exclude it. It is well settled that claims may not be construed by reference to the accused devices.

(emphasis added.)

In construing the language of the claims, the language of the claims, specification of the patent and prosecution history of the patent are most significant. See Phillips, supra. Such is especially pertinent in interpreting the claimed term "controlled amount of protic material" because that term is not generally used in chemistry and has no clear meaning to readers. (RFF 4.10 (undisputed).) All parties have agreed that the meaning of "controlled amount of protic material" depends at least "on the context of the claim and the patent specification." (RFF 4.11(undisputed).)

The claims of a patent provide substantial guidance as to the meaning of particular terms of a claim. See Phillips supra. Said claims include not only the asserted claims but also the non-asserted claims. See SRI supra and Certain Integrated Circuit Telecomm Chips And Prod.

Containing Same Including Dialing Apparatus, Inv. No. 337-TA-337, Comm'n Op., USITC Pub. 2670 at 11-12 (August 1993).

The plain language of each of the four independent method claims in issue recite a method of producing 4-ADPA comprising the steps of (a) bringing aniline or substituted aniline derivatives and nitrobenzene into reactive contact in a suitable solvent system, (b) then reacting the aniline or substituted aniline derivatives and nitrobenzene in a confined zone at a suitable temperature, and in the presence of a suitable base and controlled amount of protic material to produce one or more 4-ADPA intermediates and (c) then reducing the 4-ADPA intermediates to produce 4-ADPA. Asserted independent method claim 61 of the '063 patent and asserted independent method claim 11 of the '111 patent have the additional step (d) of reductively alkylating the formed 4-ADPA or substituted derivatives thereof which step does not involve the claimed term "controlled amount of protic material." In addition, asserted method claims 7 and 11 of the '111 patent specify that the "amount of protic material in step (b) is controlled by the continuous distillation of said protic material " (CX-1, CX-3.)

As seen by the plain language of the asserted claims of the '063 and '111 patents none of said claims (1) specify what the protic material or what specific base or specific solvent is used with the "controlled amount of protic material," (2) define "controlled amount,"(3) recite a numerical upper or lower limit for the controlled amount of protic material, (4) specify the temperature when the aniline or substituted aniline is reacted with nitrobenzene in the presence of a "controlled amount of protic material," (5) specify whether aerobic or anaerobic conditions are used in step (b) when a controlled amount of protic material is used,[14] (6) specify whether the controlled amount of protic material is used at room temperature,[15] (7) specify what is a "limiting reagent" when the "controlled amount of protic material is used,[16] or (8) specify any selectivity in products as it relates to the claimed term "controlled amount of protic material."

The administrative law judge however finds that the plain language of the non-asserted claims of the '063 and '111 patents is helpful to a person of ordinary skill in the art in the interpretation of the claimed term "controlled amount of protic material." Thus referring to the non-asserted claims of the '063 patent, the plain language of dependent method claims 2, 3, 4, 5, 6, 7, 8 and 9 specify specific solvents that may be used with the "controlled amount of protic material." The plain language of dependent method claim 10 discloses that said suitable solvent system includes a "protic solvent." The plain language of dependent method claim 11 states that the "protic solvent is selected from methanol, water and mixtures thereof." The plain language of dependent method claims 12 and 13 states that the solvent system includes aniline and up to about 4 v/v percent water based on the total volume of the reaction mixture, and that said solvent system includes dimethyl sulfoxide and up to about 8 v/v percent water based on the total volume of

---

[14] It is undisputed that aerobic conditions means that a reaction is exposed to air (the atmosphere) and thus is exposed to oxygen (CFF 136(undisputed).) Complainant's expert Bashkin testified that anaerobic means the exclusion of air and is accomplished with an inert gas which may be nitrogen. (Tr. at 279.) Respondents do not contest that meaning. <u>See</u> RRCFF 137A.

[15] It is undisputed that room temperature would be understood by one of ordinary skill in the art to be about 20 degrees centigrade. (CFF 138 (undisputed).)

[16] It is undisputed that a limiting reagent in a reaction is the reagent in the least amount such that it will stop a reaction from progressing when the reagent is used up. (CFF 130 (undisputed).)

reaction mixture respectively. The plain language of dependent method claim 14 states that said solvent system includes aniline and up to about 3 v/v percent methanol based on the total volume of the reaction mixture. According to the plain language of dependent method claim 15 states that said suitable temperature used with a "controlled amount of protic material" is from about minus 10 degrees C to about 150 degrees C. The plain language of dependent method claims 16, 17, 18, 19, 20, 21, 22, 23 and 24 provides information about the base used with the "controlled amount of protic material." The plain language of dependent method claims 25 and 26 state how the base is used in the recited step. The plain language of dependent method claim 27 is specific to a solvent and base used with the "controlled amount of protic material." Dependent method claims 28 and 29 specifically state that step (b) takes place under aerobic and under anaerobic conditions respectively. The plain language of dependent method claims 31-58 is comparable to the plain language of dependent method claims 2-29, with the exception that said dependent claims 31-58 are dependent on asserted independent method claim 30 and not dependent on non-asserted independent method claim 1.[17] The plain language of non-asserted dependent method claims 59 and 60 involve step (c) of asserted independent method claim 30. The plain language of non-asserted dependent method claims 62-89 is comparable to dependent method claim 31-58 with the exception that said dependent method claims 62-89 are dependent on asserted independent method claim 61 and not on asserted independent method claim 30. The plain language of non-asserted dependent method claims 90-94 involve step (c) of asserted independent method claim 61.

---

[17] Dependent method claim 52 does recite "said base is a crown ether in conjunction with a base source." However dependent method claim 23 merely recites "said base is a crown ether."

The administrative law judge further finds that a person of ordinary skill in the art would also conclude, based on the plain language of the claims of the '063 patent, that when a controlled amount of protic material is used, the suitable temperature can range from about minus 10° C to about 150° C and thus that temperature is a reaction variable; that a variety of bases can be used with the "controlled amount of protic material" which include alkali metals, alkali metal hydrides, alkali metal hydroxides, alkali metal alkoxides, phase transfer catalysts in conjunction with a base source, aminos and mixtures thereof and thus that what the specific base is may be a reaction variable; that the reaction of aniline and nitrobenzene with the "controlled amount of protic material" can be carried out under aerobic conditions or under anaerobic conditions, and thus that the presence of oxygen may be a reaction variable.

Referring to the non-asserted claims of the '111 patent, the administrative law judge finds that those claims would aid a person of ordinary skill in the art in the interpretation of the claimed term "controlled amount of protic material." Thus, the plain language of non-asserted independent method claim 1 discloses that a desiccant is present in step (b) to control the amount of protic material present during the reaction of aniline or substituted aniline derivative and nitrobenzene. The plain language of non-asserted independent method claim 3 states that the amount of protic material in step (b) is controlled by the continuous distillation of said protic material while the language of non-asserted dependent method claim 4 states that the protic material is water and said water is removed by continuous azeotropic distillation utilizing the water/aniline azeotrope. The plain language of non-asserted dependent method claims 8 and 12 is similar to dependent method claim 4 with the exception that claim 8 is dependent on asserted independent method claim 7 rather than non-asserted independent method claim 1 and claim 12 is dependent on asserted independent method claim 11. The plain language of non-asserted independent method claim 29 discloses that when the suitable solvent is aniline in step (a) the protic material in step (b) is water and the amount of water present at the beginning of the reaction of aniline or substituted aniline derivatives and nitrobenzene is up to about 13.8 volume percent water based on the total volume of the reaction mixture.

In interpreting claims, the administrative law judge must consider the specification of a patent, in addition to the claims of a patent. See Phillips.

The abstract of the '063 patent[18] reads:

> A method of producing 4-ADPA is disclosed wherein aniline and nitrobenzene are reacted under suitable conditions to produce 4-nitrodiphenylamine and/or 4-nitrosodiphenylamine and/or their salts, either or both of which are subsequently reduced to produce 4-ADPA. The 4-ADPA can be reductively alkylated to produce p-phenylenediamine products which are useful as antiozonants.

(CX-1 (emphasis added).) The abstract of the '111 patent is comparable to the abstract of the '111 patent although the abstract broadens "aniline" to include "substantial aniline derivatives" and "4-ADPA" to include substituted derivatives of 4-ADPA. (CX-3.) The abstract informs a person of ordinary skill that "suitable conditions" should be employed in reacting aniline and nitrobenzene. The abstract does not set forth what the "suitable conditions" are. Also there is no reference to any numerical range of reagents used in the reaction.

Under the heading BACKGROUND OF THE INVENTION and subheading "Field of the Invention," each of the '163 and '111 patent states:

> The present invention relates to methods for preparing

---

[18] The abstract is frequently looked to for determining the scope of a claimed invention. Hill-Rom Company, Inc. v. Kinetic Concepts Inc. 209 F.3d 1337, 1341, n. 1 (Fed. Cir. 2000).

> 4-aminodiphenylamine (4-ADPA) and, more particularly, relates to a method for preparing 4-ADPA wherein aniline is reacted with nitrobenzene in the presence of a base, and under conditions wherein the amount of protic material, e.g., water, is controlled, to produce a mixture rich in the salt of 4-nitrodiphenylamine and/or the salt of 4-nitrosodiphenylamine. The 4-nitrodiphenylamine and/or 4-nitrosodiphenylamine salts are isolated and subsequently hydrogenated or, alternatively, the reaction mixture itself is hydrogenated, to produce 4-ADPA in high yield. The present invention also relates to methods for preparing 4-ADPA intermediates as well as to alkylated p-phenylenediamine products useful as antioxidants.

(CX 1, col. 1, lns. 6-21, CX-3, col. lns. 15-22 (emphasis added).) The plain language of said section of the patent provides water as an example of a type of protic material and states that the amount of water is controlled to produce a mixture that is rich in 4-ADPA intermediates. The Field of the Invention section of the patent does not disclose to a person ordinary skill in the art that there should be either an upper numeric limitation or lower numerical limit to the amount of protic material that can be used in the reaction.

Following the Field of the Invention section of each of the '063 patent and '111 patent there is a "Related Art" section. The first paragraph of the section relates to a known method to prepare 4-ADPA by way of a nucleophilic aromatic substitution mechanism, wherein an aniline derivative replaces halide. The paragraph continues:

> This method involves preparation of a 4-ADPA intermediate, namely 4-nitrodiphenylamine (4-NDPA) followed by reduction of the nitro moiety. The 4-NDPA is prepared by reacting p-chloronitrobenzene with an aniline derivative, such as formanilide or an alkali metal salt thereof, in the presence of an acid acceptor or neutralizing agent, such as potassium carbonate, and, optionally, utilizing a catalyst. See, ...[citing U.S. Patents] This method is disadvantageous in that the halide that is displaced is corrosive to the reactors and appears in the waste stream and must therefore be disposed of at considerable expense. Furthermore, use of an aniline

> derivative such as formanilide, and use of p-chloro-nitrobenzene, requires additional manufacturing equipment and capabilities to produce such starting materials from aniline and nitrobenzene, respectively.

(CX-1, col. 1, lns. 25-43; CX-3, col. 1, lns. 30-50.) The process for preparing 4-ADPA that had been used by Monsanto in the early nineties involved a nucleophilic aromatic substitution mechanism wherein an aniline derivative replaces halide. See supra.

The second paragraph of the "Related Art" section refers to known methods for preparing 4-ADPA and 4-NDPA. (CX-1, col, lns. 44-51; CX-3, col. 1, lns. 51-58.) However this paragraph informs a person of ordinary skill in the art that the methods are "disadvantageous in that the yield of 4-ADPA is not acceptable for a commercial process" and "not commercially practical in terms of cost and yield." (Id.) The third paragraph of the "Related Art" section refers to yet another known method for preparing 4-ADPA and a known method to prepare p-nitrosodiphenylhydroxylamine. (CX-1, col. 1, lns. 52-61; CX-3, col. 1, lns. 59-67.) The next paragraph of the "Related Art" section refers to a known method of producing 4-nitrosodiphenylamine. However it concludes that its yield is low and is therefore not commercially practical and also that said method requires utilization of an aniline derivative which increases the cost of the starting materials. (CX-1, col. 1, ln. 62- col. 2, ln. 5; CX-3, col. 2, lns. 1-11.) The concluding paragraph of the "Related Art" section of the '063 and '111 patents reads:

> The process of the present invention does not include a halide source and therefore eliminates the expensive halide removal from the waste stream. In addition, the process of the present invention is much less expensive in terms of manufacturing costs, as well as the cost of raw materials, because instead of the derivatives of aniline and nitrobenzene, the present method utilizes aniline and

> nitrobenzene directly.

(CX-1, col. 2, lns. 6-13 CX-3, col. 2, lns. 12-19.) The "Summary Of The Invention" section of each of the '063 and '111 patents reads:

> The present invention is directed to a method of preparing 4-ADPA intermediates, namely 4-nitrodiphenylamine (4-NDPA) and the salts thereof, and/or 4-nitrosodiphenylamine (p-NDPA) and/or the salts thereof, wherein aniline and nitrobenzene are brought into reactive contact in a suitable solvent system, and then reacted in the presence of a base and under conditions wherein the amount of protic material, such as water, is controlled. The resulting reaction mixture is rich in 4-ADPA intermediates, including the 4-nitrodiphenylamine and/or 4-nitrosodiphenylamine salts. The process can be utilized according to the teachings of the present invention to produce a high yield of the 4-nitroso product (p-nitrosodiphenylamine and its salt) with little or no 4-nitro product. The 4-nitroso reaction product mixture can then be hydrogenated directly, or the 4-nitroso product can then be isolated and subsequently hydrogenated, to produce 4-ADPA in high yield. Similarly, the 4-nitro product (4-nitrodiphenylamine and its salt) can be produced in high yield with little or no 4-nitroso product, and the 4-nitro product, or the isolated 4-nitro product, can be hydrogenated to produce 4-ADPA in high yield. Alternatively, the 4-nitro and 4-nitroso products are both produced and are not isolated but the reaction mixture is hydrogenated directly to produce 4-ADPA. The resulting 4-ADPA can be utilized to prepare alkylated products of p-phenylenediamine, which products are useful as antioxidants and antiozonants. Alternatively, the 4-ADPA intermediates can be reduced and the reduced material alkylated in the same reaction vessel utilizing a ketone as a solvent.

(CX-1, col. 2, lns. 15-49; CX-3, col. 2, lns. 23-54,[19] (emphasis added).) As seen from the foregoing, the summary makes reference to a "resulting reaction mixture ... rich in 4-ADPA intermediate," producing a "high yield" of the 4-nitroso product and/or "high yield" of the 4-nitro

---

[19] The summary section of the '111 patent also states how in one embodiment, the amount of protic material is controlled with a desiccant and that the "present invention" is further directed to certain tetrasubstituted salts. (CX-3; col. 2, lns. 55- col. 3, ln. 3.)

product; and bringing aniline and nitrobenzene into reactive contract "in a suitable solvent system," and then reacted in the presence of a base and under conditions wherein the amount of protic material, such as water, is controlled. The summary places no maximum or minimum limit on the amount of protic material.

Following the "Summary Of The Invention" sections of the '063 and '111 patents, there follows "Detailed Description Of The Invention" sections. Their introductory portions paraphrase the language of the claims in issue. Thus reference is made to the use in step b) of the claims in issue of a suitable temperature, suitable base and a "controlled amount of protic material, such as water." However, no reference is made to any maximum or minimum limit in the amount of protic material, disclosing that the reaction mixture produced in step (b) can vary "depending on the specific reaction conditions selected." See CX-1, col. 2, ln 50-col. 3, ln 15; CX-3, col. 3, lns. 8-45.

Thereafter, the specifications of the '063 and '111 patents disclose that the molar ratio of aniline or substituted aniline derivatives can vary from a large excess of nitrobenzene to a large excess of the aniline or aniline derivative with the ratio affecting the ratio of 4-nitro to 4-nitroso produced. (CX-1, col. 3, lns. 15-25, CX-3, col. 3, lns. 45-56.)

The '063 and '111 patents then disclose that azobenzene is produced in step (b) of the claimed processes in variable quantities depending on the reaction conditions and that "[a]s discussed below, and as illustrated in the Examples . . . , other variables, such as the amount of base and oxygen, can also affect the amount of azobenzene produced." It is stated that one way of controlling azobenzene production is through the ratio of aniline to nitrobenzene and that as the ratio is increased, the amount of azobenzene generally decreases. Hence it is concluded that "one skilled in the art can conduct the reaction of the present invention to control the amount of azobenzene produced" (CX-1, col. 3, lns. 25-36; CX-3, col. 4, lns. 12-22.)

The specifications of the '063 and '111 patents disclose a variety of solvent systems that may be used in the claimed processes. It is disclosed that preferably aniline or substituted aniline derivative is used in excess with said compounds in excess of the molar amount of nitrobenzene serving as a solvent. It is further disclosed that solvent mixtures can be utilized wherein one or more of the suitable solvents and another solvent, such as a controlled amount of a protic solvent, e.g., methanol, are combined. There is no maximum or minimum amount of protic solvent specified. (CX-1, col. 3, lns 37-47; CX-3, col. 4, lns 24-36.)

Thereafter, the specifications of the '063 and '111 patents disclose that a wide variety of bases may be used as well as the addition of said bases in the claimed processes. Moreover, it is disclosed that the amount of base utilized can vary over a wide range, that for example the claimed processes can be conducted in a manner which is limiting in base or the reaction can be conducted in a manner which is limiting in nitrobenzene or aniline (aniline derivative) depending on other factors including the desired degree of minimization of azobenzene. (CX-1, col. 3 ln 48-col. 4, ln. 8; CX-3, col. 4, ln. 37-col. 5, ln. 6.)

Next, the specification of each of the '063 and '111 patents discloses the effect of temperature and oxygen on the claimed processes. See CX-1, col. 4, lns. 9-30; CX-3, col. 5, lns. 6-26). Thus, said portion of the '063 patent reads:

> The reaction is conducted at a suitable temperature which can vary over a wide range. For example, the temperature can fall within a range of from about -10.degree. C. to about 150.degree. C., such as from about 0.degree. C. to about 100.degree. C., preferably from about 10.degree. C. to about 80.degree. C. A most preferred

> temperature for conducting the reaction of the present invention is from about 40.degree. C. to about 70.degree. C., such as at 50.degree. C. Where aniline is utilized as the solvent under aerobic reaction conditions, as the temperature of the reaction increases, the amount of azobenzene produced increases. However, where the reaction is conducted in aniline under anaerobic conditions, higher temperatures do not necessarily increase the amount of azobenzene. Where production of azobenzene is not a problem, higher temperatures will be suitable. However, where it is desired to minimize the amount of azobenzene, lower temperatures or anaerobic reaction conditions are more suitable. Alternatively, to minimize the amount of azobenzene while conducting the reaction at higher temperatures, a solvent other than aniline can be used and the ratio of aniline to nitrobenzene can be controlled.

(CX-1, col. 4, lns. 8-30; CX-3, col. 5, lns. 8-26.) There then follows the following paragraph [PARAGRAPH hereafter] in each of the specifications of the '063 and 111 patents:

> Control of the amount of protic material present in the reaction is important. Generally, when the reaction is conducted in aniline, water present in the reaction in an amount greater than about 4% H_2O, (based on volume of the reaction mixture) inhibits the reaction of the aniline with the nitrobenzene to an extent where the reaction is no longer significant. Reducing the amount of water to below the 4% level causes the reaction to proceed in an acceptable manner. When tetramethylammonium hydroxide is utilized as a base with aniline as the solvent, as the amount of water is reduced further, e.g., down to about 0.5% based on the volume of the reaction mixture, the total amount of 4-nitrodiphenylamine and 4-nitrosodiphenylamine increases with some loss in selectivity so that more 2-nitrodiphenylamine is produced but still in minor amounts. Thus, the present reaction could be conducted under anhydrous conditions. A "controlled amount" of protic material is an amount up to that which inhibits the reaction of aniline with nitrobenzene, *e.g.*, up to about 4% H_2O based on the volume of the reaction mixture when aniline is utilized as the solvent. The upper limit for the amount of protic material present in the reaction varies with the solvent. For example, when DMSO is utilized as the solvent and tetramethylammonium hydroxide [TMAH] is utilized as the base, the upper limit on the amount of protic material present in the reaction is about 8% H_2O based on the volume of the reaction mixture. When aniline is utilized as a solvent with the same base

> [TMAH], the upperlimit is 4% H_2O based on the volume of the reaction mixture. In addition, the amount of protic material tolerated will vary with type of base, amount of base, and base cation, used in the various solvent systems. However, it is within the skill of one in the art, utilizing the teachings of the present invention, to determine the specific upper limit of the amount of protic material for a specific solvent, type and amount of base, base cation and the like. The minimum amount of protic material necessary to maintain selectivity of the desired products will also depend on the solvent, type and amount of base, base cation and the like, that is utilized and can also be determined by one skilled in the art.

(CX-1, col. 4, ln. 31 through col. 5, ln. 4; CX-3, col. 5, ln. 27-65.)

Following the above PARAGRAPH, the specification of each of the '063 and '111 patents discloses the importance of the amount of protic material in the claimed methods and teach that protic materials include, but are not limited to, water, methanol and the like. (See CX-1, col. 5, lns. 5-22; CX-3, col. 5, ln. 65-col. 6, ln. 13.)[20]

Both of the specifications of the patents in issue have a paragraph disclosing that the reaction (b) of the claimed methods can be conducted under aerobic or anaerobic conditions with the conclusion that:

> Optimal conditions for a particular set of reaction parameters, such as temperature, base, solvent and the like, are easily determined by one skilled in the art utilizing the teachings of the present invention. It has been observed that less azobenzene is produced when the reaction is conducted anaerobically with aniline as the solvent. It has also been observed that less azobenzene is produced when the

---

[20] Protic material in a completely general chemical sense could incorporate a very, very large subset of compounds. (Fu, Tr. at 1293.) The simplest interpretation of protic material is a species that has a proton, i.e. it is a hydrogen bond donor and so "it is actually a fairly broad term." (Fu, Tr. at 1296.) Protic materials are largely molecules that are capable of reversing the equilibrium between base and aniline to give deprotonated aniline and water and so a protic material would be able to protonate the deprotonated aniline and send that equilibrium back in the other direction. (Bashkin, Tr. at 310-11.)

> reaction is conducted aerobically with DMSO, and other similar solvents, as the solvent.

(CX-1, col. 5, lns. 22-46; CX-3, col. 6, ln. 65-col. 7, ln. 6.) In addition, the specifications of the '063 and '111 patents later state:

> The chemical reactions described above are generally disclosed in terms of their broadest application to the method of this invention. Occasionally, the reaction conditions may not be applicable as specifically described to each reactant and reagent within the disclosed scope. For example, certain suitable bases may not be as soluble in one solvent as they are in other solvents. The reactants and reagents for which this occurs will be readily recognized by those skilled in the art. In all such cases, either the reactions can be successfully performed by conventional modifications known to those skilled in the art, e.g., by appropriate adjustments in temperature, pressure and the like, by changing to alternative conventional reagents such as other solvents or other bases, by routine modification of reaction conditions, and the like, or other reactions disclosed herein or otherwise conventional, will be applicable to the method of this invention. In all preparative methods, all starting materials are known or are readily preparable from known starting materials.
>
> Without further elaboration, it is believed that one skilled in the art can, using the preceding description, utilize the present invention to its fullest extent. The following preferred specific embodiments are, therefore, to be construed as merely illustrative, and not limitative of the remainder of the disclosure in any way whatsoever.

(CX-1, col. 6, lns. 26-52; CX-3, col. 7, ln. 52-col. 8, ln. 8 (emphasis added).) Thus the patents disclose that all of the subsequent examples are "preferred specific embodiments":

With respect to the "preferred specific embodiments" of the '063 and '111 patents, the specification of the '063 patent has twelve preferred specific embodiments (Examples 1-12) (CX-1) while the specification of the '111 patent has twenty-one preferred specific embodiments (Examples 1-21.) The first twelve preferred specific embodiments of the '063 patent are identical to the first twelve preferred specific embodiments of the '111 patent with the exception of Table 6 of Example 8 and Table 7 of Example 9. (CX-1; CX-3.)

Example 1 shows a broad range of conditions under which the chemistry of the reaction can be carried out. (CFF 162 (undisputed).) Example 1A illustrates a neat reaction of aniline and nitrobenzene under aerobic conditions at room temperature. (CFF 169 (undisputed).) The reaction was shown to have consumed nearly all the nitrobenzene after two hours although the reaction was allowed to stir for eighteen hours. After this time, greater than 99 percent nitrobenzene was consumed. 4-NDPA and p-NDPA products are generated with HPLC analysis indicating the following yields of products based on nitrobenzene: 4-NDPA (15 percent), p-NDPA (73 percent), 2-NDPA (0.7 percent), phenazine (1.9 percent) and phenazine-N-oxide (0.7 percent.)[21] The reaction mixture was then hydrogenated directly to generate 4-ADPA. (CX-1, col. 7, lns. 19-47.) In Example 1A, the base is tetramethylammonium hydroxide (TMAH) dihydrate. (CFF 170 (undisputed).)

Example 1B is an example of the reaction of aniline and nitrobenzene at room temperature in dimethylsulfoxide (DMSO) under anaerobic conditions. (CFF 179 (undisputed).) TMAH dihydrate was used in the reaction. The reaction was allowed to proceed for four hours. Conversion of nitrobenzene was 68 percent. HPLC analysis indicated the following yields based on nitrobenzene: 4-NDPA (30.5 percent), p-NDPA (33.6 percent), azobenzene (2.6 percent), azoxybenzene (trace). (CX-1, col. 7, lns. 55-59.)

---

[21] Yield of product based on nitrobenzene as used in Example 1A means that the number of millimoles of nitrobenzene that is at the start of the reaction is used as a measuring stick and if one gets the same millimoles of product, there is 100 percent yield. This is generally done for the reagent that is the limiting reagent in a reaction. (Bashkin, Tr. at 271.)

Example 1C is an example of a neat reaction between aniline and nitrobenzene at room temperature under anaerobic conditions. (CFF 189 (undisputed).) TMAH dihydrate was used in the reaction. All the nitrobenzene was consumed after several hours. Analysis indicated the following yields based on nitrobenzene: 4-NDPA ten percent, p-NDPA 76 percent and phenazine 5 percent. (CX-1, col. 7, ln. 67-col. 8, ln. 3.)

Example 1D is an example of the reaction between aniline and nitrobenzene at room temperature in DMSO. (CFF 199 (undisputed).) TMAH dihydrate was used in the reaction. The example illustrates generation of 4-NDPA and p-NDPA from its salts utilizing water and acid. The reaction was allowed to stir for 18 hours after which 80 percent of the nitrobenzene had been consumed. Isolated yields based on nitrobenzene consumed were 4-NDPA (66 percent) and p-NDPA (29 percent.) (CX-1, col. 8, lns. 9-23.)

Example 1E is an example of the reaction of aniline and nitrobenzene in DMSO at 80° C under aerobic conditions. (CFF 209 (undisputed).) TMAH dihydrate was used in the reaction. The reaction mixture was heated to 80° C in an oil bath and maintained at that temperature for 5 hours. Yields by HPLC based on nitrobenzene was 4-NDPA (35 percent), p-NDPA (51 percent), azobenzene (3.1 percent).

Example 1F is an example of the reaction of aniline and nitrobenzene in DMF under aerobic conditions. (CFF 219 (undisputed).) TMAH dihydrate was used in the reaction. The reaction was allowed to stir for 2 hours during which time 39 percent of the nitrobenzene was consumed. The yields were 99 percent of 4-NDPA and a trace of p-NDPA. (CX-1, col. 8, lns. 37-45.) The specification indicates that the amount of TMAH dihyrate varied in Examples 1A thru IF.

Example 2 "illustrates that the reaction of the present invention can be conducted over a range of temperatures." (CX-1, col. 8, lns. 48-50.) In Example 2, all of the variables were held constant, except for the temperature. The reaction was run in the air (aerobic conditions). (CFF 229 (undisputed).) In this example, 34.6 mmole of TMAH dihydrate was added. The reaction was allowed to proceed for 5 hours. Table 1 of Example 2 shows that at various temperatures, the percent selectivity and percent yield of products produced varied as well as the nitrobenzene conversion. For example, at 80° C with 100 percent conversion of nitrobenzene, there was 89 percent selectivity of p-NDPA and 89 percent yield of p-NDPA in addition to a selectivity and yield of 55 percent of azobenzene, while at 23° C with 73 percent nitrobenzene conversion, there were 71 percent selectivity of p-NDPA and 51 percent yield of p-NDPA and a selectivity and yield of 17 and 12 percent respectively of azobenzene. (CX-1, col. 8, ln. 48– col. 9, ln. 15.) The reaction of aniline with aniline and oxygen to produce azobenzene is not a desirable reaction. (CFF 231 (undisputed).) Also the reaction of aniline with aniline and oxygen to produce azobenzene is a completely separate reaction from the reaction of aniline with nitrobenzene in the presence of TMAH. (CFF 232 (undisputed).) In Example 2, when the reaction is run at 80° C under aerobic conditions, the limiting reagent is nitrobenzene. (CFF 233 (undisputed).) (CFF 234 (undisputed).)

Example 3 commences with the sentence "[t]his example illustrates that control of the amount of protic material present in the reaction is important." (CX-1, col. 9, lns. 20-21.) Thus Example 3 of each of the '063 and '111 patents discloses a controlled experiment in which all of the reaction variables were held constant, except for the amount of protic material (water or methanol) added to the reaction and the reaction was conducted aerobically at room temperature.

(CFF 235 (undisputed).) Water or methanol were added, with the water varied from 0, 10, 50 and 100 microliters (μL) and the methanol from 10, 50 and 100 μL. The reactions were allowed to run and the reactions sampled after 16 hours. (CX-1, col. 9, lns. 20-45.) One of ordinary skill in the art would understand that Example 3 is conducted under room temperature. (CFF 236 (undisputed).) In Example 3, aniline is the solvent. (CFF 245 (undisputed).) The reaction is at atmospheric pressure and the limiting reagent is TMAH dihydrate. (CFF 249, CFF 250 (both undisputed).) This is in contrast to Example 2 where the limiting reagent is nitrobenzene. (CFF 234 (undisputed).) Example 3 showed the following as to the addition of protic material:

TABLE 2

Volume (μL)	%	Ratio mmole 4-NDPA + p-NDPA/ 2-NDPA + Phenazine	Yield (mmole) 4-NDPA + p-NDPA
Water Added	Water*		
0	2.2	6.2	0.83
10	2.45	8.5	0.68
50	3.45	11.5	0.18
100	4.7	5.0	0.05
Methanol Added	Methanol*		
10	0.25	8.8	0.67
50	1.25	16	0.57
100	2.5	35	0.42

*The % water and methanol is by volume. In the case when no water was added the water present in the reaction was introduced from the tetramethylammonium hydroxide dihydrate.

Example 4 of the patents in issue "illustrates that various solvents can be utilized in the practice of the method of this invention to produce 4-NDPA and/or p-NDPA products." The reaction conditions were as in Example 1D (with the solvent "1-methyl-2-pyrrolidinone"), 1B (with the solvent DMSO/THF) and 1D (with the solvent pyridine) (CX-1, col. 9, lns. 50-65.)

Example 5 of both patents in issue "illustrates various bases which can be utilized in the method of the present invention to produce 4-NDPA and/or p-NDPA products." The reactions set forth in Table 4 were conducted except that the base of Example 1 was substituted with a variety of bases shown in Table 4. (CX-1, col. 9, ln. 65, col. 10, ln. 12.)

Example 6 of the '063 and '111 patents "illustrates the unexpected increase in selectivity and nitrobenzene conversion utilizing the method of the present invention as compared to the method disclosed in Ayyangar et al."[22] (CX-1, col. 10, lns. 16-19; CX-3, col. 11, lns. 37-40.) The example states that the reaction of acetanilide, nitrobenzene, sodium hydroxide, potassium carbonate in DMSO was run according to the procedure described by Ayyangar et al. Analysis of this reaction indicated that 37 percent of the nitrobenzene was converted and the following yields based on nitrobenzene were achieved: 4-NDPA (6 percent), p-NDPA (4.5 percent), azobenzene (0.7 percent). The example further disclosed that in comparison, when the reaction is conducted according to the teachings of the present invention, the conversions of nitrobenzene and selectivities to the desired products are greatly increased; and that for example, when the reaction is conducted as described in Example 1D but stirred at room temperature for 5 hours (in Example 1D, the reaction was allowed to stir for 18 hours), the nitrobenzene conversion was 85 percent (compared to 80 percent in Example 1D) and the yield based on nitrobenzene was as follows: 4-

---

[22] An Ayyangar et al., Tetrahedron Letters, vol. 31, Nov. 22, pp. 3217-3220 (1990 publication is listed in the first page of the patents in issue under OTHER PUBLICATIONS (CX-1; CX-3.)

NDPA (18 percent), p-NDPA (51 percent) and azobenzene (3 percent). The Ayyangar et al reaction was also disclosed in the example to have been run at room temperature and the analysis of the reaction showed no conversion of nitrobenzene and no products detected. (CX-1, col. 10, lns. 16-47.)

Example 7 of both patents in issue shows "how the ratio of p-NDPA/4-NDPA can be controlled by the ratio of aniline/nitrobenzene." In this example, TMAH dihydrate was used and the reaction was allowed to proceed at room temperature in air for 14 hours. Table 5 of the example showed that with the volume ratio of aniline/nitrobenzene ranging from 0.33 to 50, said ratio can vary from 0.1 to 6. (CX-1, col. 10, lns. 50, col. 11, ln. 7.)

Example 8 of the patents in issue "illustrates the effect that the amount of protic material present in or added to the reaction has on the extent of conversion and yields of 4-NDPA and p-NDPA." In this example, the amount of water added to a reaction of aniline, nitrobenzene and TMAH dihydrate in DMSO was varied from zero to 500 µL while keeping the total reaction volume constant. The reaction was allowed to react aerobically at room temperature for 24 hours. Table 6 of said example of the '063 patent reads as follows:

TABLE 6

Volume (µL) Water Added	% Water	% Conversion Nitrobenzene	Yield (mmole) 4-NDPA + p-NDPA
0	2.3	89	150
50	3.5	73	99
150	6	63	62
300	9.75	12	0.23
500	14.7	3	0.05

(CX-1, col.11, lns. 10-35.) However, Table 6 of Example 8 of the later '111 patent reads:

TABLE 6

Volume (μL) Water Added	% Water	% Conversion Nitrobenzene	Yield (mmole) 4-NDPA + p-NDPA
0	2.3	89	1.5
50	3.5	73	0.99
150	6	63	0.62
300	9.75	12	0.23
500	14.7	3	0.05

Example 9 of the '063 and '111 patents "illustrates the effect that increasing the amount of base has on yields of 4-NDPA and p-NDPA under conditions where the amount of protic material added to the reaction is kept constant." Three identical reactions were run except that the amount of TMAH dihydrate was varied in each. The reaction was allowed to react for 24 hours at room temperature in the air. Table 7 of the '063 patent showed the following:

TABLE 7

Volume Water Added	% Water	Grams Base	mMoles Base	Yield (mmole) 4-NDPA + p-NDPA
100	4.7	0.330	2.5	0.05
100	4.7	0.660	5.0	0.15
100	4.7	1.65	12.5	1.24

However, Table 7 of the later '111 patent showed the following:

TABLE 7

Volume Water Added	% Water	Grams Base	mMoles Base	Yield (mmole) 4-NDPA + p-NDPA
100	4.3	0.330	2.5	0.05
100	5.9	0.660	5.0	0.15
100	9.6	1.65	12.5	1.24

(CX-1, col. 11, lns. 35-57; CX-3, col. 12-lns. 53-col. 13, ln. 10.)

Example 10 of both patents in issue reads as follows:

> This example illustrates the reaction of aniline, nitrobenzene and tetramethylammonium hydroxide dihydrate under anaerobic conditions at 50° C.
>
> A 500 mL four-necked round-bottom flask equipped with a mechanical stirrer, addition funnel, thermometer, and nitrogen inlet was charged with 90 mL of aniline. The aniline was purged with nitrogen and tetramethylammonium hydroxide dihydrate (54 g, 0.42 mole) was added in one portion. The reaction mixture was heated to 50° C. under a nitrogen blanket with stirring. Once the temperature in the reaction vessel reached 50° C, nitrobenzene (10 mL, 95 mmole) was added dropwise to the vigorously stirred mixture of aniline and base. The nitrobenzene was added at a rate such that the addition was complete within 30 minutes. The temperature of the reaction increased to 65° C. during the nitrobenzene addition. The reaction was allowed to stir for an additional 90 minutes after which time it was analyzed by HPLC. Nitrobenzene conversion = 100%. Yields based on nitrobenzene: p-NDPA (88.5%), 4-NDPA (4.3%), phenazine (3.6%), azobenzene (3.6%).

(CX-1, col. 11, ln. 60-col. 12, ln. 14; CX-3, col. 13, lns. 12-31.) In Example 10, the limiting reagent is nitrobenzene. (CFF 282 (undisputed).)

Example 10 does not literally recite in black and white, for a person with no skill in the art, the amount of water content. However, the idea of controlling the amount of protic material is a recurring theme in the patents in issue as Fu admitted. Moreover, it is abundantly clear that an objective of the patents in issue is to be able to obtain high yields and selectivity of 4-ADPA intermediates and avoid the production of such undesired products as azobenzene. In addition, it is a person of ordinary skill in the art with at least a masters degree in organic chemistry and some experience in the art of making 4-ADPA and an awareness of all pertinent prior art that is interpreting the claims in issue, not a person devoid of such background.

Example 11 of both patents in issue "illustrates that tetramethylammonium ion salt of "4-NDPA and p-NDPA" can be produced in the method of the present invention." In this example, aniline and was reacted with TMAH dihydrate in a controlled atmosphere dry box under argon. The aniline and base mixture was delivered directly to nitrobenzene and the reaction immediately turned red with a precipitate solid, which on examination by spectroscopy, was shown to be 4-NDPA. A portion of the red precipitate was dissolved in wet acetonitrile and subjected to HPLC analysis which indicated that 4-NDPA was the major component. (CX-1, col. 12, lns. 15-40; CX-3, col. 13, lns. 34-57.)

Example 12 of the '063 patent (its last example) and of the '111 patent "illustrates the conversion of 4-ADPA to N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, a useful antiozonant for the protection of rubber products." (CX-1, col. 12, lns. 40-45; CX-3, col. 13, lns. 60-62.)

Example 13 of the '111 patent illustrates the continuous removal of water from the reaction of aniline, nitrobenzene and TMAH by a vacuum distillation of the aniline/water azeotrope. At 100 percent conversion of nitrobenzene, typical selectivity and yields of 4-ADPA intermediates is 95.5 percent (92.1 percent of 4-nitrosodiphenylamine and 3.4 percent of 4–nitrodiphenylamine) and only 3.4 percent azobenzene. Comparing Example 13 with the examples of the '063 patent, Example 13 was conducted on a much larger scale. (CX-3, col. 14, lns. 40-44.) As shown by Appendix C, infra, the percent water at the start of the reaction is 13.8.

Example 14 illustrates the use of various solvents in the reaction of aniline, nitrobenzene and base to generate 4-ADPA intermediates. Table 8 summarizes the results. Said table indicates e.g., that with the solvent hexane at 94.8 percent nitrobenzene conversion, the yield of 4-ADPA intermediates is 70.1 percent and the yield of azobenzene is 23.5 percent. In contrast, with the solvent toluene, at 99.5 percent nitrobenzene conversion, the yield is 97.3 percent 4-ADPA intermediates and only 1.5 percent azobenzene. (CX-3, col. 14, lns. 6-50.)

Example 15 illustrates how a variety of different phase transfer catalysts can be employed in the reaction of aniline, nitrobenzene and base to produce 4-ADPA intermediates. The results were summarized in Table 9 and shows a wide variety in the percent yields of 4-ADPA intermediates. (CX-3, col. 15, ln. 44- col. 16, ln. 38.)

Example 16 of the '111 patent illustrates how the addition of an external desiccant can be used to absorb water in the reaction in replacement of the azeotropic distillation described in Example 13. (CX-3, col. 16, lns. 39-42.)

Example 17 of the '111 patent illustrates how the amount of phenazine produced in the reaction of Example 15 can be reduced by increasing the steric bulk of the tetraalkylammonium ion used as phase transfer catalyst. As shown in Table 11 with the base benzyltrimethyl ammonium hydroxide and 100 percent nitrobenzene conversion, the yield was 0.1 percent phenazine, 74.7 percent 4-NODPA, 12.4 percent 4-NDPA and 11.7 percent azobenzene. In contrast, with the base tetramethyl ammonium hydroxide and 100 percent nitrobenzene conversion, the yield was 2.24 percent phenazine, 43 percent 4-NODPA, 34 percent 4-NDPA and 12.1 percent azobenzene. (CX-3, col. 17, lns. 12-34.)

Example 18 of the '111 patent illustrates how the various substituted aniline derivatives can be employed in the reaction of nitrobenzene and TMAH dihydrate. (CX-3, col. 17, ln. 35- col. 8, ln. 52.)

Example 19 of the '111 patent illustrates how a variety of diamino nucleophiles will couple to the para position of nitrobenzene. (CX-3, col. 18, ln. 55-col. 19 ln. 3.)

Each of Examples 20 and 21 of the '111 patent illustrates step (c) of the asserted claims of the '111 patent. (CX-3, col. 10, lns. 5-67.)

The prosecution history is part of the intrinsic evidence and provides evidence of how an inventor and the Patent Office understood a patent in issue. See Phillips 415 F.3d at 1317. A review of the prosecution histories of the '063 and '111 patents show that in a May 5, 1995 preliminary amendment in the prosecution of the '111 patent, the applicants corrected errors in the specification of the '063 patent that were found in Table 6 of Example 8 and Table 7 of Example 9. The corrections were explained as follows:

> The amendments to page 22, Table 6 of the specification are to correct obvious typographical errors. Since the limiting reagent in the reaction is nitrobenzene (1.9 mmole), it is clear that the yield of 4-ADPA intermediates must be less than 1.9 mmole. As such, applicants respectfully submit that it is clear that a decimal point was omitted in the mmole yields of Table 6 that have been amended. The amendment to Table 7, page 23, line 6 of the specification is to correct a typographical error in the % water. The amendment to Table 7, page 23, lines 7 and 8 of the specification is to correct errors made in the calculation of the amount of water. Since the first column of Table 7 is constant and the text at page 22,

> lines 30-31 states that the amount of protic material added to the reaction is kept constant, and since the tetramethylammonium hydroxide is used as a dihydrate in varying amounts, i.e. the amount of water added via the base varies, it is clear that the values in the second column of Table 7 are not constant but rather increase as the amount of base increases. Calculations of the % water in Table 7 are provided is attached. Appendix B. Therefore, applicants respectfully submit that the amendments to the specification are not new matter and respectfully request that the amendments be entered.

(CX-4 at 111-082-083.) Appendix B was as follows:

In the same amendment, applicants provided the calculation (Appendix C) for the volume percent water present at the beginning of the reaction in Example 15. (CX-4, 111-0820.) Appendix C was as follows:

Applicants, in the preliminary amendment of May 5, 1995, also discussed the "Frimer et al and Wohl references cited in the Information Disclosure Statements." (CX-4 at 111-083.) It was argued that Frimer et al disclose the reaction of aniline with nitrobenzene as solvent using potassium t-butoxide/crown ether as base under "dry" conditions; that Wohl (Chemische Berichte, 34. P. 2442 (1901)) discloses the reaction of aniline with nitrobenzene in aniline as solvent using NaOH as base under "anhydrous" conditions, and Wohl (Chemische Berichte, 36, p. 4135 (1903)) identifies the minor product of this reaction of aniline with nitrobenzene as p-nitrosodiphenylamine (p-NDPA); that therefore Wohl (1901) and Frimer et al are equivalent references with respect to the invention as claimed and that both Wohl and Frimer et al teach processes that result in poor yields of 4-ADPA intermediates; and that the major difference between Wohl (1901) and Frimer et al is that Frimer et al considered the reaction of aniline and nitrobenzene in the presence of a suitable base and a crown ether phase transfer catalyst. However, applicants argued that neither Wohl nor Frimer et al taught conducting the reaction of aniline and nitrobenzene in the presence of a controlled amount of protic material; that in addition, neither the Wohl reference nor Frimer et al taught conducting the reaction of a substituted aniline derivative and nitrobenzene in the presence of a controlled amount of protic material; that applicants discovered the criticality of controlling the amount of protic material present in the reaction of aniline or substituted aniline derivatives with nitrobenzene; and that neither reference teaches controlling the amount of protic material during the reaction by either use of a desiccant or continuous distillation. (CX-4 at 111-083-084.)

Applicants, in the preliminary amendment filed May 5, 1995, also argued that pending claim 94, which corresponds to claim 23 of the '111 patent (CX-4 at 111-081), distinguishes over

Frimer et al and Wohl; that claim 94 requires that the amount of protic material be controlled such that the selectivity is at least 0.97 wherein selectivity is the molar ratio of 4-ADPA intermediates to undesired products; that the basis for the selectivity of 0.97 can be found in Example 15 to which Appendix C, <u>supra</u> relates; that the maximum selectivity taught by the Wohl and Frimer et al references is the selectivity in Frimer et al of "0.383;" and that calculations of selectivity are shown in Appendix A. Appendix A was as follows:

(CX-4 at 111-086.) Applicants argued that neither Frimer et al nor Wohl disclosed or suggested a process which is capable of achieving the selectivity to 4-ADPA intermediates attainable with the claimed process; and that therefore, controlling the amount of protic material present during the reaction to achieve a selectivity of at least 0.97 resulted in at least a 150 percent increase in selectivity to 4-ADPA intermediates. (CX-4 at 111-84.)

Applicants, in the preliminary amendment on May 5, 1995, further argued that pending claims 100, 101, and 102, which correspond to claims 29, 30 and 31 respectively of the '111 patent (CX-4 at 111-081-082) further distinguish over Frimer et al and Wohl; that claim 100 (patent claim 29) requires that the reaction be conducted in aniline as the suitable solvent and that the volume percent water present at the beginning of the reaction is up to 13.8 volume percent; that Frimer et al teach starting with "dry" conditions, i.e. no protic material; and that neither Frimer et al nor Wohl discloses or suggests conducting the reaction with a controlled amount of protic material of up to 13.8 volume percent. (CX-4 at 111-085.)

Following the filing of the preliminary amendment on May 5, 1995, the Patent Office on March 12, 1996 rejected claims of the application which resulted in the '111 patent "under the judicially created doctrine of obviousness-type double patenting as being unpatentable over the claims of patent U.S. Patent Nos. 5,117,063 and 5,453,541." (CX-4 at 111-091.) On August 19, 1996, applicants filed a terminal disclaimer. (CX-4 at 111-095.) Thereafter, a notice of allowance issued. (CX-4 at 111-101.)

Respondents have argued that based on the certain language in the PARAGRAPH, the claim term "controlled amount of protic material" means that when aniline is the solvent, the amount of water must be kept at about 4 percent or less and that Examples 3 and 8 of the specification supported and were the basis for, the statements in said PARAGRAPH that about 4 percent protic material (water) was the limit with aniline and about 8 percent water was the limit with DMSO. (RBr at 25-6.) The staff argued that in said PARAGRAPH:

> [t]he specification expressly sets forth a limitation for water by volume of "up to about 4%" when aniline is used as the solvent with any base other than tetramethylammonium hydroxide ("TMAH"), but when used with TMAH, the maximum amount of water by volume is 4%. See, e.g., CX1, Col, 4, ll. 32-37, 48-52, 58-60; CX3, Col. 5, ll. 28-32, 43-46, 52-55. The specification also states that "about 8%" is the maximum amount of water by volume when DMSO is the solvent with TMAH as the base. CX1, Col. 4, ll.54-58; CX3, Col. 5, ll. 48-52. Thus, the Staff submits that the inventors acted as their own lexicographers when they expressly and unequivocally defined what constitutes a "controlled amount" when water is the "protic material" and aniline or DMSO is used as the solvent - - a maximum of "up to about 4%" H2O by volume when aniline is the solvent with any base, except TMAH, "4%" with TMAH as the base; and a maximum of "about 8%" when DMSO is the solvent with TMAH as the base.

(SBr at 13.)

Complainant argued that its proposed interpretation for "controlled amount of protic material" i.e., the amount of protic material should be controlled between an upper limit and a lower limit with the upper limit being that amount of protic material beyond which the reaction between nitrobenzene and aniline is inhibited and the lower limit being that amount below which the desired selectivity for 4-ADPA intermediates is not maintained, is the proper interpretation.

Based on the record in this investigation, the administrative law judge finds that the term "controlled amount of protic material," means that the amount of protic material (which is not limited to water) should be controlled between (1) an upper limit of protic material which is the amount of protic material beyond which the reaction between nitrobenzene and aniline (or substituted aniline) is inhibited and (2) a lower limit of protic material which is the amount of protic material below which the desired selectivity for 4-ADPA intermediates is not maintained.[23] This interpretation, he finds, is applicable to and inclusive of all of the examples and disclosures in the patents in issue and thus is not specific to any particular solvent or reaction conditions.

Considering the plain language of the claims of the '063 patent and the '111 patent supra, the administrative law judge finds that a person, as to the claimed term "controlled amount of protic material"[24] would conclude that the protic material may be methanol, water or mixtures thereof. In addition for the claimed reaction of aniline and nitrobenzene with the controlled amount of protic material, a variety of solvents can be used, which include: aniline; nitrobenzene; dimethylsulfoxide; dimethylformamide; N-methylpyrolidone [sic]; pyridine; a protic solvent;

---

[23] Neither respondents nor the staff proposed an interpretation for "controlled amount of protic material" that would apply to solvents other than aniline and to protic material other than water. Respondents argued that the patents in issue are far "less clear" about how the claimed term in issue should be defined and that there is no need to "agonize" over a broader interpretation. (RRBr at 2.) The staff limits the interpretation to aniline, water and TMAH and argued that complainant has not offered any quantitative definition of the term "controlled amount" of protic material that would satisfy complainant's proposed construction. (SBr at 9, 14.) Based on the evidence, the administrative law judge concludes that a quantitative definition for the term "controlled amount of protic material" would not be indicated to a person of ordinary skill in the art for interpreting "controlled amount of protic material."

[24] The parties have proposed the same construction for the claimed term "controlled amount of protic material" as found in the asserted claims of not only the '063 patent but also the '111 patent. This is to be expected. Thus, while the '111 patent is further derived from a continuation-in-part '120 application filed on March 27, 1992 (CX-1, CX-3), both patents in issue are derived from the identical parent application, viz., the '876 application filed on June 21, 1991, both patents are directed to the method of preparing 4-amino-diphenylamine (4-ADPA), and there is common inventorship at least as to inventors Bashkin and Stern. Thus, the named inventors on the '063 patent are Stern and Bashkin while the named inventors on the '111 patent include Stern and Bashkin. See also Omega Engineering, Inc. v. Raytek Corp. 334 F.3d 1314, 1334, Fed. Cir. 2003, where the Court held that when two patents issued from continuation-in-part application derived from one original application, all applications can be looked to for claim interpretation.

aniline and up to about 4 v/v % water based on the total volume of the reaction mixture; dimethylsulfoxide and up to about 8 v/v % water based on the total volume of the reaction mixture; aniline and up to about 3 v/v % methanol based on the total volume of the reaction mixture; or aniline with the base tetraalkylammonium hydroxide.

In addition, considering the language of the claims of the '111 patent, supra, the administrative law judge finds, in addition to what a person of ordinary skill in the art would learn from the plain language of the claims of the '063 patent, that the amount of protic material in step (b) may be controlled through the use of a desiccant or by a continuous distillation process; that when protic material is used in step (b), undesired products may be produced in step (b) and that when the suitable solvent is aniline in step (a), the protic material is water in step (b), the water present at the beginning of the reaction of aniline or substituted aniline derivatives and nitrobenzene may be up to about 13.8 v/v percent water based on the total volume of the reaction mixture.

The administrative law judge finds that a person of ordinary skill in the art would further learn from the plain language of the claims and the specifications of the '063 patent and the '111 patent as to factors which govern the upper limit of protic material (the amount of protic material beyond which the reaction of nitrobenzene and aniline or substituted aniline is inhibited) and lower limit of protic material (the amount of protic material below which the desired selectivity for 4-ADPA intermediates is not maintained); that there are a number of reaction variables relating to steps (a) and (b) of the claims in issue for producing 4-ADPA intermediates (the objective of steps (a) and (b) of the claims in issue), while still maintaining the claimed conditions for producing the desired 4-ADPA intermediates (Bashkin, Tr. at 260-1); and that those variables relate, with respect to steps (a) and (b) of the claimed methods in issue, at least to a variation in the specific solvent system, the specific base and amount of base, the specific protic material and amount of protic material, the specific temperature, the specific amount of aniline (or substituted aniline) and nitrobenzene employed and whether the steps are carried out under aerobic conditions or anaerobic conditions.

After considering the claims of the '063 and '111 patents and referring to the remaining portions of the patents (starting with the abstract), the administrative law judge finds that a person of ordinary skill in the art would learn the importance of certain reaction conditions for producing the 4-ADPA intermediates, and later 4-ADPA, in high yield (see abstract and Field of the Invention sections supra); that the claimed methods in issue eliminate a halide source and/or improve on the yields of 4-ADPA intermediates of prior art methods (see Related Art section supra); that in the claimed methods in issue, the amount of protic material should be controlled to produce a reaction mixture rich in 4-ADPA intermediates and hence a high yield of 4-ADPA (see Field of Invention and Summary Of The Invention sections supra);[25] that in steps (a) and (b) of the claimed methods, the molar ratio of reactants which affect the ratio of desired reaction products produced as well as the production of undesired azobenzene is a consideration; that a variety of solvent systems and temperatures may be used in steps (a) and (b) with temperature and the presence of oxygen affecting the amount of undesired azobenzene; and that when it is desired to minimize the amount of azobenzene, lower temperatures or anaerobic reactions conditions are more suitable; that when conducting the reaction at higher temperatures to minimize the amount

---

[25] Respondents' Beckman agreed that because the paragraph of the Summary Of The Invention section refers to "high" yield of the 4-nitroso product and also uses the word "rich," such would indicate that rich means something with a high yield. (Tr. at 2040.)

of azobenzene produced, a solvent other than aniline can be used; and that when the reaction is conducted in aniline under anaerobic conditions, higher temperatures do not necessarily increase the amount of azobenzene. (see Detailed Description Of The Invention section supra).

The administrative law judge finds that a person of ordinary skill in the art (in this investigation, a person having at least a masters degree in organic chemistry and some experience in preparing 4-ADPA by prior art methods, see supra) reading the PARAGRAPH, supra, would conclude that "[a] 'controlled amount' of protic material is an amount up to that which inhibits the reaction of aniline [or substituted aniline] with nitrobenzene" (CX-1, col. 4, lns. 49-51; CX-3, col. 5, lns. 43-45), and that a "minimum amount of protic material [is that] necessary to maintain selectivity of the desired products" with no specificity to any particular solvent or reaction conditions. (CX-1, col. 4, ln. 68-col. 5, ln. 1; CX-3, col. 5, lns. 61-63.) The person would learn from said PARAGRAPH that there are no absolute limits in the amount of protic material, which is consistent with the earlier language of the '063 and '111 patents and the claims of said patents as well as the subsequent "several specific embodiments" (examples) since said PARAGRAPH contains numerous qualifiers and illustrative rather than limiting language, such as "[g]enerally," "about," "e.g.," and "[f]or example." The person would further conclude from the PARAGRAPH that the person's interpretation of "controlled amount of protic material" is substantiated by the fact that "the amount of protic material will vary with type of base, amount of base, and base cation used in the various solvent systems;" that "it is within the skill of one in the art, utilizing the teachings of the present invention, to determine . . . [the] specific upper limit of the amount of protic material for a specific solvent, type and amount of base, base cation and the like;" and that "[t]he minimum amount of protic material necessary to maintain selectivity of the desired products will also depend on the solvent, type and amount of base, base cation and the like that is utilized and can also be determined by one skilled in the art." (CX-1, col. 4, ln. 61 - col. 5, ln. 4; CX-3, col. 5, lns. 55-65.)

The administrative law judge further finds that a person with at least a masters degree in organic chemistry, some experience in the art of making 4-ADPA and awareness of all pertinent prior art, would conclude that the twelve preferred specific embodiments of the '063 patent and the twenty-one preferred specific embodiments of the '111 patent (see supra) support the person's interpretation of "controlled amount of protic material." Thus, Example 1 shows a broad range of reaction conditions in which the chemistry of the claimed reaction of aniline and nitrobenzene in the presence of protic material may be carried out to produce varying amounts of 4-ADPA intermediates, depending on the reaction conditions. Examples 2-5 and 7-9 show controlled experiments, where typically everything is held constant except for one reaction variable. See supra. Thus, Example 2 shows that the claimed reactions of nitrobenzene and aniline (where nitrobenzene is the limiting agent) can be conducted over a range of temperatures in the presence of protic material with the percent selectivity and percent yield of reaction products varied as well as the nitrobenzene conversion. Example 3, where the limiting reagent is TMAH dihydrate) illustrates the importance of the control of the amount of protic material present in the reaction. However, in that example, one of ordinary skill in the art would "recognize immediately" that it is "impossible" to proceed to complete conversion of nitrobenzene (Fu, Tr. at 1399-403); and that the reaction of Example 3 was "deliberately run . . . to relatively low conversion" (Fu, Tr. at 1450), and that the intent of Example 3 is not in fact, "to simply maximize the yield." (Fu, Tr. at 1452-54.)

The administrative law judge finds that the general teachings of said PARAGRAPH and the language of the patents in toto, would direct the person of ordinary skill in the art in this investigation, to all of the "preferred specific embodiments" which would include not only the teachings of Examples 3 and 8, [26] but also the teachings of Example 10 of both patents in issue and Examples 13 and 15 of the '111 patent as well as claim 29 of the '111 patent. Said Example 10 has some 10.5 percent water at the start of the reaction, and uses aniline as a solvent. As Sinorgchem's expert Fu testified:

> Q. Let's move on now. Now starting at line 63 (col. 4 of CX-1) where it provides, "however, it is within the skill of one in the art, utilizing the teachings of the present invention," . . .
>
> Q. And this would include all of the teachings of the patent of the '063, correct?
>
> A. Right, so I think that the reader should read the entire patent.
>
> Q. And this would include example 10, correct?
>
> A. It would include the entire patent.
>
> Q. And example 10 is in the patent, correct?
>
> A. Yes.

(Tr. at 1434.)

The plain language of Example 10 of the patents in issue discloses high conversion rates

---

[26] Respondents argued that "[t]hese experiments [Examples 3 and 8] supported and were the basis for the statements in the specification that about 4 . . . [percent] protic material (water) was the limit with aniline and about 8 . . . [percent] water was the limit with DMSO." (RBr at 25.) Thus respondents have limited the basis for their interpretation to only certain language of the PARAGRAPH and certain examples while ignoring the remaining language of the patents in issue including other "preferred specific embodiments."

and selectivity with a 100 percent conversion of nitrobenzene. Thus a 92.8 percent yield of 4-ADPA intermediates are obtained compared with only a 3.6 percent yield of the undesirable azobenzene. See supra. Also the plain language of Example 13 of the '111 patent, at 100 percent nitrobenzene conversion, gives a 95.5 percent yield of 4-ADPA intermediates and only a 3.4 percent yield of the undesirable azobenzene. See supra. The administrative law judge finds that one of ordinary skill in the art would not ignore Example 10 when an objective of the patents in issue is to produce high yields of 4-ADPA intermediates with a selectivity favoring production of those intermediates.[27] Moreover, the plain language of Example 3 shows that the patentees were not concerned with yields and/or selectivity in that Example. Sinorghem's expert Fu acknowledged that one of ordinary skill in the art would view Example 3 as "not trying to maximize the percentage yield in these reactions." See supra. Also, the plain language of Example 8 with respect to yields of 4-ADPA intermediates (corrected Table 6), which the Examiner accepted in the prosecution and made no new matter rejection (see supra), shows that the patentees were not concerned with yields and/or selectivity in that Example. Thus with 3.5, 6, 9.75 and 14.7 percent added water, said yields of 4-ADPA intermediates were below 1 percent. (See supra).

Referring to the language of the PARAGRAPH, Fu further agreed that "and the like" in the PARAGRAPH would mean to a person of ordinary skill in the art other reaction parameters and variables including temperature and that the temperatures of Examples 3 and 10 of the patents

---

[27] Sinorgchem's Fu admitted that all things being equal, higher yields are better than lower yields, as long as the compound that one is calculating the yield of, is a desired compound. (Tr. at 1387.) He further admitted that in the reaction in issue, the 4-ADPA intermediates are desired compounds and azobenzene is not a desired compound. (Id.)

in issue are different. (Tr. at 1434-35.) In addition, Fu agreed that a reasonable reading of the language the "amount of protic material tolerated will vary" in the PARAGRAPH would be the amount that does not inhibit the reaction of aniline with nitrobenzene and that the amount of protic material can be different depending on reaction conditions. (Tr. at 1433.) Respondents' expert Beckman also agreed that said language of the PARAGRAPH teaches that the upper limit of the amount of protic material depends on a number of reaction variables. (Tr. at 2035-36.)

In addition, Sinorgchem's expert Fu agreed that one of ordinary skill would be able to calculate an approximate percent water by volume at the start of the reaction in Example 10 and would come up with a number in the general area of 9 to 10 percent based on valid assumptions which the person would be willing to make "if they are not concerned with being off by, say 1 or 2 percent water." (Tr. at 1339-40, 1342.)[28] Respondents' expert Beckman agreed that the amount of water in Example 10 is between 9 and 9½ and percent and that this amount can be calculated. (Tr. at 949, 2031-34.) Fu and Beckman further admitted that under their claim construction for the term in issue, which is respondents' claim construction, Example 10 of the patents in issue would not be covered. (Tr. at 1413, 2029.)

Sinorgchem's Fu testified that there is "no indication in example 10 that the intent of the example is to teach the reader of the patent about what the patentees mean by controlled amount of protic material. . . [and there is] no indication that the patentees are focused on investigating the effective amount of protic material in the course of the reaction." (Tr. at 1335.) Fu later testified that there is "no express calculation or expression of the percent water" in Example 10 and thus

---

[28] The amount of water present in Example 10 can be calculated by calculating the amount of water introduced in the form of TMAH dihydrate. (Stern, Tr. at 567-69.)

there is no information that "immediately" tells one of ordinary skill in the art what the percent water is in the Example 10 reaction. (Tr. at 1406.) Beckman testified that "there's no target point mentioned in the example [Example 10] as to what they're trying to keep the water at, the water is going to be allowed to drift during the reaction." (Tr. at 2029.) However, as Fu testified, the idea of controlling the amount of protic material is a recurring theme in the patents in issue and the substance of the term "controlled amount of protic material" is used repeatedly in the patents in issue and its use is not limited to said PARAGRAPH. (Fu, Tr. at 1294-95.)

Example 13 of the '111 patent discloses the reaction of aniline and nitrobenzene and TMAH to produce, at 100 percent nitrobenzene conversion, a high selectivity and high yields of 4-ADPA intermediates. <u>See</u> <u>supra</u>. In Example 13, the water content is 10.8 percent at the start of the reaction. (CX-303 at 13, Bashkin, Tr. at 2088-89, 2106.[29])

Referring to Example 15, applicants in the preliminary amendment of May 5, 1995 in the prosecution, informed the Examiner that the percent water at the start of the reaction of aniline, nitrobenzene and base was 13.8 percent and even presented the Examiner with the calculation for determining the percentage of water. <u>See</u> Appendix C <u>supra</u>.[30] Moreover, claim 29 of the '111

---

[29] The administrative law judge rejects respondents' argument that this evidence is based on "improper rebuttal testimony." (ROCFF 297.) Respondents had the opportunity to cross-examine Bashkin at the hearing on his testimony which rebutted the earlier testimony of respondents' witnesses relating to respondents' interpretation of "controlled amount of protic material." Moreover, from the start of this investigation the interpretation of the claimed term "controlled amount of protic material," has been crucial. As with Example 10, the administrative law judge finds that a person of ordinary skill in the art, as should have respondents, would want to know the content of water at the start of the reaction in Example 13 which respondents could have determined, at least through their experts who have acknowledged that the calculation of the water at the start of the reaction in issue can be done by a person of ordinary skill in the art.

[30] Applicants also presented the Examiner with calculations for percentage water in Table 7 (<u>see</u> Appendix B <u>supra</u>) and calculation for selectivity as to Example 15 (see Appendix A

patents set forth this percentage. See supra.

In SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc., 242 F.3d 1337, 1339 (Fed. Cir. 2001), relied on by respondents, the Court explained "[o]ne purpose for examining the specification is to determine if the patentee has limited the scope of the claims." Watts v. XL Sys., Inc., 232 F.3d 877, 882, 56 USPQ2d 1836, 1839 (Fed. Cir. 2000). Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question. In SciMed, the claims at issue covered a balloon catheter for coronary angioplasty procedures. The catheter had a passageway or "lumen" for a guide wire and a passageway used to inflate the balloon. Id. Only two arrangements for the lumens were practiced in the art: side-by-side and coaxial. The Court limited the asserted claims to coaxial lumens because the patent, without exception, described the lumens of the invention as coaxial, and the specification distinguished the invention from prior art on the ground that the lumens were coaxial. Id. at 1342-43.

In Alloc v. ITC, 342 F.3d 1361, 1368-69 (Fed. Cir. 2003), also relied on by respondents, the Court, the Commission and this administrative law judge construed the claims that were in issue to require "play" (a space between a locking groove on a first panel and the locking element of an adjacent panel) though none of the asserted patent claims recited this limitation. As was the case in SciMed, the Court observed that the specification criticized prior art interlocking panels that did not have any play. Id. at 1369-70. All of the figures and embodiments in the specification

---

supra.)

either implied or expressly disclosed play in the locking groove. Id. at 1370. In addition, the Court found that "the specification teaches that the invention as a whole, not merely a preferred embodiment, provides for play in positioning of the floor boards." Id. at 1369. Further, during prosecution of the parent application, Alloc told the USPTO that "the claimed 'play' of the present invention . . . enabled the panels to slide movably with respect to each other along the direction of the joint edge, which is specifically claimed in the penultimate paragraph of claim 1. . . [and that] the play further enables disassembly of the floor when required." Id. at 1371. The Court observed that the applicant persuaded the USPTO that "play" enabled the features that were claimed. Id. at 1372. In conclusion, the Court pointed out that the applicant emphasized the criticality of play during prosecution, and could not obtain a claim construction disregarding the statements that it made during prosecution. Id.

In contrast to cases relied on by respondents, the administrative law judge finds that the patentees did not intentionally define "controlled amount of protic material" to exclude Example 10 of the '063 patent, Example 13 of the '111 patent, certain language of the PARAGRAPH and other parts of the specifications consistent with Examples 10, 13 and 15. Moreover, when aniline is a solvent, claim 29 of the '111 patent specifically recites a limitation that the upper limit of protic material is "up to 13.8 volume %," which means that "controlled amount of protic material" cannot be defined to have an upper limit of 4% when aniline is the solvent. Also, the Federal Circuit has held that construing a claim to exclude a preferred embodiment "is rarely, if ever, correct and would require highly persuasive evidentiary support." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1583, (Fed. Cir. 1996). The administrative law judge finds no persuasive evidentiary support for excluding the "preferred specific embodiments" of Examples

10, 13, and 15 and the limitation of claim 29 of the '111 patent.

Respondents rely on Example 3 of the patents in issue. Example 3 is an example that is designed to explain to a person of ordinary skill in the art that the amount of protic material was important and to illustrate the effects of changing the amount of protic material. (Bashkin, Tr. at 310.) The reaction conditions of Example 3 were not optimized for the production of the 4-ADPA intermediates with respect to the starting materials aniline and nitrobenzene because the conversion of nitrobenzene is low. (Crich, Tr. at 929-30.) The patents in issue however do provide examples in which the conversion of nitrobenzene is high and in which the yield of the 4-ADPA intermediates is high, and one of ordinary skill in the art, having read the entire patents in issue to gain an understanding of all terms therein and of the underlying chemistry, would gravitate to one of those other examples in attempting to carry out the chemistry (Id.) Moreover, Example 3 does describe the reaction run in air (aerobic conditions) and at room temperature, which one of ordinary skill in the art would know was around 20 degrees C for 16 hours. Example 3 then specifies the base, which is the limiting reagent, and it also specifies that the reaction is run with both aniline and nitrobenzene in excess. (Crich, Tr. at 1003-05.) However, Example 3, where the yield of 4-ADPA intermediates is less than 10 percent, does not disclose how the amount of protic material would be tolerated under other reaction conditions and in fact, the patents in issue explicitly state that one of ordinary skill in the art would know how to determine what that amount of protic material would be by varying the reaction parameters. (Id.,) Example 3, through Table 2, outlines a set of experiments which show that by controlling the amount of water, there will be an effect on both yield and selectivity of 4-ADPA intermediates and thus a person of ordinary skill in the art would understand that the amount of protic material in the reaction has a critical effect on both yield and selectivity of 4-ADPA intermediates and hence if the person would optimize the reaction in issue, the person would pay attention to the fact that protic material is important. (Stern, Tr. at 614-18.)

The PARAGRAPH does have the language <u>inter alia</u>, "e.g., up to about 4 % H_20 based on the volume of the reaction mixture when aniline is utilized as the solvent." One of ordinary skill in the art, however, would not conclude that the 4 percent, <u>under all reactions conditions set forth in the patents in issue</u> is an upper limit, in view of other language of the patents including other language in the PARAGRAPH. (Crich, Tr. at 1079-80.) The administrative law judge finds that the language "e.g., up to about 4 %" was clearly meant to be an example as the "e.g." shows. (Crich, Tr. at 1080.) One of ordinary skill in the art would recognize that the only conditions in the "e.g." clause is when aniline is the solvent. Because temperature and pressure conditions are not specified in the "e.g." clause, one of ordinary skill in the art would conclude that the e.g. clause relates to room temperature and ambient pressure. (Crich, Tr. at 1081, 1087-88.)[31] However, even from other language in the PARAGRAPH, the administrative law judge finds that a person of ordinary skill in the art would understand that when conditions are applied to the reaction in issue, the amount of protic material tolerated will vary, e.g., the type of base, the amount of base, etc. (Crich, Tr. at 1090-91.)

Sinorgchem's expert Fu repeatedly testified that a person of ordinary skill in the art in interpreting the claimed term "controlled amount of protic material" would read the "whole

---

[31] The plain language of Example 3 of the patents in issue indicates that the reaction of Example 3 is "run in the air at room temperature and were sampled after 16 hours." (CX-1, col. 9, lns. 39-31). Hence, the administrative law judge finds that a person of ordinary skill in the art would find that only Example 3 supports the "e.g." clause of the PARAGRAPH.

patent," and "taking all of the teachings of the patent together" (Tr. at 1462), would have to "read the patent in its entirety" (Tr. at 1296), upon "reading the patent in its entirety" (Tr. at 1302), that said person would read the patent "carefully" (Tr. at 1344), and reading "the entire patent carefully." (Tr. at 1358.) He further testified that he considered the "entire patent" and the "entire specification." (Tr. at 1306.) Respondents' expert Beckman agreed that one skilled in the art would read the entire patent including the examples and would not ignore Example 10. (Tr. at 2036-37.) Fu, Beckman, respondents and the staff based their interpretation of the claimed term in issue only on certain language of the PARAGRAPH and on Examples 3 and 8 of the patents in issue even though the intrinsic evidence also comprises other examples of the patents in issue, other language of the PARAGRAPH, the claims of the patents in issue, other portions of the patents in issue including the language in the BACKGROUND OF THE INVENTION and SUMMARY OF THE INVENTION sections, other language in the DETAILED DESCRIPTION OF THE INVENTION section of said patents as well as the prosecution history of the patents in issue where applicants argued that patent claim 29 requires that the reaction in issue when aniline is the solvent has a volume percent water at the beginning of the reaction up to 13.8 volume present and the Examiner accepted that argument. See supra. Considering all of the intrinsic evidence, the administrative law judge rejects the interpretation proposed by respondents and the staff of the claimed term in issue. An important principle of claim interpretation is that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent including the specification." Phillips, 415 F.3d at 1313. Moreover, the prosecution history is also "part of the intrinsic evidence." Id., at 1317.

Based on the foregoing, the administrative law judge rejects the interpretation of "controlled amount of protic material" proposed by respondents and the staff.

2. The Claimed Term "Suitable Solvent System"

It is undisputed that a suitable solvent system permits nitrobenzene and aniline to be brought into reactive content. (CFF 359 (undisputed).)

IX. Infringement

In a section 337 investigation of alleged infringement of a patented process, the complainant has the burden of proof, by a preponderance of the evidence, that the imported goods have been made by the patented process. Ultra-Tex Surfaces, Inc. v. Hill Bros. Chem. Co., 204 F.3d 1360, 1364 (Fed. Cir. 2000); Rohm and Haas Co. v. Brotech Corp., 127 F.3d 1089, 1092 (Fed. Cir. 1997). An entity may be shown to infringe an asserted claim of a patent either directly or indirectly. Direct infringement is governed by Section 271(a). 35 U.S.C. § 271(a). Indirect infringement is governed by Sections 271(b) and (c). 35 U.S.C. §§ 271(b) and (c).

In order to directly infringe a process claim, a party must perform each and every recited step of the claimed process. RF Delaware, Inc., v. Pacific Keystone Techs., Inc. 326 F.3d 1255, 1267 (Fed. Cir. 2005) Canton Bio-Medical, Inc. v. Integrated Liner Techs., Inc., 216 F.3d 1367, 1370 (Fed. Cir. 2000) (Canton); Joy Techs., Inc. v. Flakt, Inc., 6 F.3d 770, 773 (Fed. Cir. 1993) (Joy Techs). This rule applies to determining direct infringement under Section 271(a) and to determining infringement under Section 271(g), which prohibits the importation, sale, or use within the United States of a product made outside the United States by a process patented in the United States. See Avery Dennison Corp. v. UCB Films PLC, 1997 WL 665795 at 2 (N.D. Ill. Oct. 20, 1997) (court held "like § 271(a), § 271(g) imposes liability for direct infringement," and found no direct infringement where defendant was alleged to have performed only the initial step of the process patent).

Indirect infringement may be established by proving a party actively induced infringement by another. 35 U.S.C. § 271(b). There can be no induced infringement without proof of direct infringement by another. Joy Techs., 6 F.3d at 774-775. In order to establish induced infringement, it must be shown that the alleged infringer knowingly and intentionally caused another to directly infringe an asserted claim. MercExchange, L.L.C. v. eBay, Inc., 401 F.3d 1323, 1332-33 (Fed. Cir. 2005); Hewlett-Packard Co. v. Bausch & Lomb, Inc., 909 F.2d 1464, 1469 (Fed. Cir. 1990).

Indirect infringement may also be established by proving a party contributed to infringement by another. 35 U.S.C. § 271(c). Contributory infringement requires proof that a party offered to sell, sold, or imported into the United States a component of a patented machine, a material or apparatus for use in practicing a patented process that constituted a material part of the invention 35 U.S.C. § 271(c). Further proof is required showing that said party knew the component, material, or apparatus to be especially made or adapted for use in infringing the patent and that the component, material, or apparatus was not a staple article of commerce having a substantial non-infringing use. Id.; Hewlett-Packard Co., 909 F.2d at 1469. There can be no contributory infringement without proof of direct infringement by another. Joy Techs., 6 F.3d at 774-775.

Infringement can be found "literally" or under the so-called "doctrine of equivalents." In order to prove literal infringement, it must be shown that each and every element of an asserted claim is present exactly in an accused process. Strattec Sec. Corp. v. Gen. Auto. Specialty Co., Inc., 126 F.3d 1411, 1418 (Fed. Cir. 1997). To prove infringement under the doctrine of equivalents, it must be shown that an accused process contains each and every element of an asserted claim or its substantial equivalent (all elements rule). Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co., 520 U.S. 17, 39-40 (1997). An element of an accused device or process can be found to be an equivalent of a recited claim element if it differs only insubstantially from the claimed element. Id. For example, an accused element may be found to be the substantial equivalent of a claim element if it performs substantially the same function, in substantially the same way, to produce substantially the same result as the claimed element. Graver Tank & Mfg. Co., v. Linde Air Prods. Co., 339 U.S. 605, 608 (1950); Tanabe Seiyaku Co., Ltd. v. Int'l Trade Comm'n, 109 F.3d 726, 732 (Fed. Cir. 1997); Spectra Corp. v. Lutz, 839 F.2d 1579, 1582 (Fed. Cir. 1988). Applied to process claims, it has been held that infringement under the doctrine of equivalents requires proof that the accused process "perform[s] substantially the same steps as the patented process, in substantially the same way, to obtain the same result." Fromson v. Anitec Printing Plates, Inc., 132 F.3d 1437, 1446 (Fed. Cir. 1997).

The determination of whether an accused product or process infringes a patent, either directly or indirectly, is a two-step process. First, as a matter of law, the Court must determine "the meaning and scope of the patent claims asserted to be infringed." Markman, 52 F.3d at 976; see also Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559, 1572 (Fed. Cir. 1997). Second, the properly construed claims are compared to the accused process. See Markman, 52 F.3d at 976; Regents, 119 F.3d at 1572. The comparison is made to determine whether every claim limitation is present in the accused process either literally or equivalently. See generally Cole v. Kimberly-Clark Corp., 102 F.3d 524, 532 (Fed. Cir. 1996).

1. Motion No. 533-63 To Strike (KKPC's P1 And P2 Processes)

On December 2, 2005, complainant moved to strike the testimony and exhibits regarding whether KKPC's P1 and P2 processes for producing 4-ADPA and 6PPD infringe the '063 and '111 patents. (Motion Docket No. 533-63.)

KKPC, in a response dated December 16, 2005, argued that Motion No. 533-63 should be denied.

The staff, in a response dated December 16, 2005, argued that Motion No. 533-63 should be granted.

The complaint did not contain any allegations relating to KKPC's P1 and P2 processes. However, complainant's Motion No. 533-57 supplemented its pre-hearing statement to "clarify that it is not alleging that the P-1 and P-2 processes infringe any of the asserted claims," and represented that it was not seeking relief against products made using those processes. Motion No. 533-57 has been granted. Moreover, complainant in its memorandum supporting Motion No. 533-63 represented that it "does not seek to include 4-ADPA or 6PPD produced by KKPP's P1 and P2 processes within the scope of any limited exclusion order" (memo at 2). Thus, while complainant could not technically move to terminate the investigation as to KKPC's P1 and P2 processes or otherwise remove allegations of infringement against such processes under Commission rule 210.2(c), because the complaint did not allege infringement of KKPC's P1 and P2 processes, the administrative law judge finds that complainant's representations in its Motion No. 533-57 and in its memorandum in support of Motion No. 533-63, are tantamount to a motion to terminate. See Flash Memory Circuits and Products Containing Same, Inv. No. 337-TA-382, Comm'n. Op. at 15-16 (1997). Thus Motion No. 533-63 is granted.[32]

2. Respondents Sinorgchem And Sovereign

Complainant argued that Sinorgchem's accused process for making 4-ADPA and 6PPD infringes the claims at issue; and that Sovereign violates section 337 by importing 6PPD produced by Sinorgchem's infringing process. (CBr at 61-68.)

Sinorgchem argued that its process does not infringe the asserted claims. (RBr at 44-51.)

The staff argued that it is undisputed that{ }

{

} Hence it is argued that the accused process does not literally satisfy the claimed "controlled amount of protic material" limitation. It is also argued that because the inventors expressly disavowed coverage of methods wherein more than four percent water by volume is used when aniline is the solvent, said limitation cannot be satisfied under the doctrine of equivalents. (SBr. at 30-51.)

The administrative law judge finds that complainant has established, by a preponderance of evidence, that the Sinorgchem process to make 4-ADPA and 6PPD literally infringes the asserted claims in issue.

---

[32] See Order No. 13 (December 22, 2005) in Certain Power Supply Controllers And Products Containing Same Inv. No. 337-TA-541, which granted complainant's motion to terminate regarding specified products and further found that complainant's withdrawal established that said products would not fall within the bounds of a remedial order. The Commission determined to non-review Order No. 13 on January 17, 2006. In view of complainant's representations in this investigation, the administrative law judge recommends that KKPC's P1 and P2 processes should not fall within the bounds of any remedial orders that may issue on behalf of complainant involving KKPC, assuming arguendo, the Commission finds that there is a violation of section 337 by KKPC. See infra, Section IX, 3 where the administrative law judge finds that complainant has not established that KKPC infringes any claim in issue.

{ }[33]{

}

---

[33] { }

{

}

In Sinorgchem's process,{ } literally meets the claim term "bringing aniline and nitrobenzene into reactive contact" of element (a) of claim 30. (CFF 410 (undisputed).) { } Sinorgchem's process literally meets the claim term "suitable solvent system" of claim element (a) of claim 30. (CFF 411(undisputed).) { } Sinorgchem's process literally meets the claim term "reacting the aniline and nitrobenzene" of element (b) of claim 30. (CFF 412 (undisputed).) { } Sinorgchem's process literally meet the claim term "suitable temperature" of element (b) of claim 30. (CFF 414 (undisputed).){ } Sinorgchem's process literally meets the claim term "suitable base" of element (b) of claim 30. (CFF 415 (undisputed).){ } Sinorgchem's process literally meets the claim term "protic material" of element (b) of claim 30. (CFF 416 (undisputed).)

{

}

{

} Moreover at the hearing, respondents' expert Fu was directed to his deposition testimony, supra and gave further testimony:

> Q. Dr. Fu, I direct you to your deposition at page 214, starting at line 5.
>
> "Question: Dr. Crich's definition [complainant's proposed definition] and that's the definition of controlled amount of protic material, would cover Sinorgchem's process, correct?
>
> "Answer: So if the only information that's available to the reader of the patent is a comment in quotes that a controlled amount of protic material is an amount to that which inhibits the reaction of aniline, nitrobenzene, if there's no other information in the patent that deals with the issue of controlled amount of protic material, then that would include the Sinorgchem process."
>
> * * *
>
> THE WITNESS: Again, you seem to be ignoring part of my discussion, selectively quoting. I said so if, if, that's a conditional, the only information that's available to the reader of the patent is a comment in quotes that a controlled amount of protic material is an amount to that which inhibits the reaction of aniline and nitrobenzene, if there's no other information in the patent that deals with the issue of controlled amount of protic material, then that would include the Sinorgchem process.
>
> Those ifs are not fulfilled in the '063 patent, so there is nothing inconsistent between what I said today and what I said in the deposition and again I think you are distorting my testimony.

(Tr. at 1468-70 (emphasis added).) Thus Fu admitted that a controlled amount of protic material is an amount which inhibits the reaction of aniline and nitrobenzene although he attempted to qualify said admission with the language of the PARAGRAPH. (See also, Fu's earlier testimony, Tr. at 1374-76.)

The administrative law judge rejects Sinorgchem's argument that there are differences between Sinorgchem's process and the claimed process in issue such that complainant has not established infringement. (RBr at 49-51.) The claims at issue, are directed toward methods of making 4-ADPA and 6PPD. { }
{ }
{ } Bio-Tech. General Corp. v. Genentech Inc., 80 F.3d 1553, 1559 (Fed. Cir. 1996) (finding that technique distinctions for performing the claimed process steps are not a basis for non-infringement). Moreover, assuming arguendo, {
} as the Federal Circuit held in Ryco, Inc. v. Ag-Bag Corp., 857 F.2d 1418 (Fed. Cir. 1988), the fact "that the accused device is an improvement on the claimed subject matter does not avoid infringement even under the doctrine of equivalents." Id., at 1427.
{
} Apparatus distinctions, however, are irrelevant in determining infringement of process claims. Amstar Corp. v. Envirotech Corp., 730 F.2d 1476, 1482 (Fed. Cir. 1984) (finding that apparatus distinctions are irrelevant in determining infringement of a process claim). Moreover, the fact that { } does not negate infringement. Id.

Based on the foregoing, and in light of the proper interpretation of "controlled amount of protic material" and{ }

{

} the administrative law judge finds that complainant has established, by a preponderance of the evidence, that the Sinorgchem process to make 4-ADPA and 6PPD literally infringes the asserted claims in issue. In light of said finding, he further finds that complainant has established, by a preponderance of evidence, that Sovereign's importation into, and sale within the United States after importation of 6PPD purchased from Sinorgchem in China (SX-5), is a violation of section 337 since it involves infringement of at least method claim 61 of the '063 patent and method claim 11 of the '111 patent.

3. Respondent KKPC

Complainant argued that KKPC's importation of 6PPD which is made from Sinorgchem's 4-ADPA is a violation of the Tariff Act, regardless of whether KKPC alone performs all of the steps of the patented process. Complainant further argued that because Sinorgchem's 4-ADPA is made by Flexsys' patented process and KKPC's reductive alkylation of that 4-ADPA to 6PPD using the patented process, KKPC's importation should be precluded. (CRBr at 48.)

KKPC argued that its commercial 6PPD processes do not directly infringe any claim in issue; that KKPC does not indirectly infringe; that KKPC and Sinorgchem are not liable as joint infringers; and that section 337 does not excuse complainant from proving direct infringement by KKPC, viz., KKPC performs all of the recited steps of the asserted claims. (RBr at 51-64.) The staff argued that KKPC is not a "direct infringer" by virtue of KKPC's conversion of 4-ADPA obtained from Sinorgchem into 6 PPD; and that even assuming that Sinorgchem's process is determined to infringe any of the claims at issue, KKPC should not be found to have infringed any claim in issue. (SBr at 32.)

KKPC has not made 4-ADPA for commercial purposes since 1995, when its 4-ADPA plant (then owned by KMI, KKPC's joint venture with Monsanto) was severely damaged in a fire. (Lim, Tr. at 1518, 1545, 1547.) However, KKPC has continued to produce commercially 6PPD only from 4-ADPA that it purchases from third party commercial vendors, including Sinorgchem. (Lim, Tr. at 1568-1569, 1572.)[34]

KKPC produces its commercial 6PPD from 4-ADPA by the known process of reductive alkylation{ } (Kim, Tr. at 1750-1761; RX-501C at KKPC-ITC 04980T.) KKPC's commercial 6PPD produced by this process is called Kumanox 13. (Kim, Tr. at 1758.) The reductive alkylation process KKPC uses to make its Kumanox 13 is the same reductive alkylation process the '063 and '111 patent described as being "well known." (Crich, Tr. at 1051; 1053-55; CX-1; CX-1, col. 6, lns. 6-10; CX-3, col. 7, lns. 33-37.) KKPC's reductive alkylation process{ } (Kim, Tr. at 1763.) KKPC's reductive alkylation process also{ } (Kim, Tr. at 1762-63.)

The process KKPC currently uses to produce 6PPD from 4-ADPA{ }(Kim, Tr. at 1758-59; RX501 at 4981T.) That method used to transform 4-ADPA received from Sinorgchem{

---

[34] It is stipulated that KKPC has sold for importation into the United States 6PPD it owns and produced at its plant in Korea using 4-ADPA purchased from Sinorgchem in China. (SX-4.)

}(Lim, Tr. at 1527, 1572; Kim, Tr. at 1773.)

Claim 30 of the '063 patent in issue and claim 7 of the '111 patent in issue are both directed to a process for producing 4-ADPA. Each of the claims in issue recites three primary steps: (a) bringing aniline and nitrobenzene into reactive contact; (b) reacting the aniline and nitrobenzene in the presence of a suitable base, suitable solvent and controlled amount of protic material to produce 4-ADPA intermediates; and (c) hydrogenating the 4-ADPA intermediates to produce 4-ADPA. (CX-1, CX-3.) Claim 61 of the '063 patent and claim 11 of the '111 are both directed to a process for producing 6PPD. These claims recite four primary steps, the first three of which are essentially identical to the first three steps of said claims 30 and 7. The fourth step (d) is reductively alkylating the 4-ADPA produced by the first three steps, in order to produce the end product, 6PPD. (Id.)

In order to prevail on any direct infringement contention, Flexsys must prove that KKPC performs all of the recited steps of the asserted claims. See Canton, supra. However, at the hearing, complainant failed to introduce any evidence to demonstrate that KKPC performs all of the steps of any of the asserted claims. To the contrary, KKPC's witnesses Lim and Kim demonstrated that KKPC does not carry out any of the steps of the 4-ADPA process claims (claim 30 of the ‘063 patent and claim 7 of the ‘111 patent) and only carries out the final reductive alkylation step of the 6PPD process claims (claim 61 of the ‘063 patent and claim 11 of the ‘111 patent). Hence complainant has not met its burden in establishing any direct infringement by KKPC.

The administrative law judge rejects any argument by complainant that KKPC indirectly infringes any of the claims in issue or that KKPC is a "joint" infringer. There is testimony that the only relationship between KKPC and Sinorgchem is that of commercial buyer and seller of chemical products; that KKPC is only interested in the purity of the 4-ADPA that it purchases; and that KKPC has no interest in how Sinorgchem makes (or its prior suppliers made) the 4-ADPA that KKPC purchases. (Lim, Tr. at 1573-74, 1587-89; Kim, Tr. at 1767-68, 1771-72.) The administrative law judge finds no evidence to the contrary.

Based on the foregoing, the administrative law judge finds that complainant has not established, by a preponderance of the evidence, that KKPC infringes any claim in issue. Hence he finds that there has been no violation of section 337 by KKPC.

X. Validity

1. Motion Nos. 533-62 (Wohl) And 533-64

On November 15, 2005, respondents KKPC and Sinorgchem moved to strike evidence of the purported replication of a Wohl reaction involving aniline and nitrobenzene.[35] (Motion Docket No. 533-62.)

Complainant, in a response dated December 2, 2005, argued that Motion No. 533-62 should be denied.

The staff, in a response dated December 2, 2005, argued that Motion No. 533-62 should be granted.

Movants, on December 16, 2005, moved for leave to reply to complainant's opposition "to respond to arguments and to clarify certain factual representations" by complainant. (Motion

---

[35] A 1903 Wohl reference is relied on by respondents in their allegation that the claims in issue are not valid under 35 U.S.C. § 103.

Docket No. 533-64.) Motion No. 533-64 is granted.

The specific evidence respondents moved to strike are the following:

> CX-193 identified by complainant as Triplett Notebook, page No. 007208 dated 6/8/95.
> The demonstrative exhibit photographs relating to CX-193, viz.,:
> CX-175 through CX-183.
>
> Oral Testimony of Bashkin Regarding CX-193 at Nov. 7, 2005, Tr. at 331:20-339:3 (testimony by Bashkin).
>
> Oral Testimony of Rains Regarding CX-193: Nov. 8, 2005, Tr. at 712:8-714:9, 735:20-736:9 (testimony by Rains).

Movants, in support of Motion No. 533-62, argued that an alleged June 8, 2005 Triplett replication of a 1903 Wohl experiment should be excluded because: (1) it is not substantially similar to the Wohl experiment in that it seeks to "replicate" only some Wohl parameters while "grossly exaggerating" the length and heat parameters of said experiment; (2) it guesses at some of the Wohl parameters that remain unknown; and (3) additional significant steps were taken by complainant to "slant" the results in favor of the desired outcome which steps are not part of Wohl's original experiment.

It is not denied that Triplett was deposed on July 21, 2005; that respondents have been aware of CX-175 through 183 since September 15, 2005 when they were served with Bashkin's expert report, and that respondents were given the opportunity to cross-examine Bashkin and Rains during the hearing. Also JX-23 (RX-633), identified with a date of 7/2/05, and as designated pages of the deposition of Ralph (Boone) Triplett, is in evidence and respondents have not moved to strike JX-23. Moreover, as repeatedly stated by the administrative law judge at the hearing, respondents had the opportunity to argue the weight to be given to the evidence in issue in their post-hearing submissions.

Motion No. 533-62 is denied.

2. Obviousness

Respondents argued that "long known and widely practiced processes in combination with Wohl, render the asserted claims 30 and 61 [of the '063 patent] obvious." (RBr at 80-85.) It is argued that the "asserted '111 patent claims 7 and 11 are invalid as obvious in view of the teachings of Wohl and other prior art." (RBr at 85-87.)[36] Thus it is argued that the "long-known commercial processes for making 4-ADPA and 6PPD teach everything in the four asserted claims . . . except for the supposedly 'new' coupling reaction between aniline and nitrobenzene [and that] Wohl disclosed the 'new' coupling reaction." (RRBr at 43.)

Complainant argued that respondents have failed to prove invalidity by clear and convincing evidence; that none of the references cited by respondents addressed the problem that the inventors solved, and that respondents' argument is nothing more than impermissible hindsight. (CRBr at 25-32.) It is further argued that complainant has demonstrated the presence of secondary considerations. (CRBr at 34.)

The staff argued that respondents have not demonstrated that one of ordinary skill in the art would have combined Wohl with any reference because Wohl taught away from the inventions in issue. (SBr at 37.) It is also argued that there is "strong evidence of non-obviousness." (Id.)

---

[36] The Wohl relied on is Wohl Chemische Berichte, 36 at 4135 (1903) (CX-2 at 063-119, 063-120, cited under OTHER PUBLICATIONS in the '063 and '111 patents. (CX-1; CX-3.)) The Wohl article was cited by the Examiner in the prosecution of the applications which led to the '111 patent in issue. Applicants in the prosecution argued that Wohl did not teach conducting the reaction of aniline or a substituted aniline derivative and nitrobenzene in the presence of a controlled amount of protic material. The '111 patent thereafter issued. See Section VIII. 1 supra.

Under 35 U.S.C. § 103, a patent is valid unless "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." The ultimate question of obviousness is a question of law, but "it is well understood that there are factual issues underlying the ultimate obviousness decision." Richardson-Vicks Inc. v. The Upjohn Co., 122 F.3d 1476, 1479 (Fed. Cir. 1997); Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1570 (Fed. Cir. 1997). To establish obviousness, the patent challenger must demonstrate, by clear and convincing evidence, that "there is a reason, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the references, and that would also suggest a reasonable likelihood of success." Ruiz v. A.B. Chance Co., 234 F.3d 654, 664-65 (Fed. Cir. 2000) (Ruiz). The Federal Circuit has rejected "broad conclusory statements regarding the teaching of multiple references" so as to guard against "the subtle but powerful attraction of a hindsight-based obviousness analysis." In re Dembiczak, 175 F.3d 994, 999 (Fed. Cir. 1999). It is not proper to use the patents in issue as templates from which to piecemeal prior art references. As the Federal Circuit has stated: "[t]o draw on hindsight knowledge of the patented invention, when the prior art does not contain or suggest that knowledge, is to use the invention as a template for its own reconstruction--an illogical and inappropriate process by which to determine patentability." Sensonics, Inc. v. Aerosonic Corp., 81 F.3d 1566, 1570 (Fed. Cir. 1996); (citing (W.L. Gore & Assoc. v. Garlock, Inc.,721 F.2d 1540, 1553 (Fed. Cir. 1983)). "The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made." (Id. citing Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1138 (Fed.

Cir. 1985).)

After construing the claims, the next "step in an obviousness inquiry is to determine whether the claimed invention would have been obvious as a legal matter, based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) secondary considerations of nonobviousness, also known as 'objective indicia of nonobviousness." Ruiz, 234 F.3d at 660; Graham v. John Deere Co., 383 U.S. 1, 17 (1966). Secondary considerations, also part of the Graham factors, include commercial success, long-felt but unresolved need, failure of others, copying, and unexpected results. Id.

With respect to the scope and content of the prior art, as the Federal Circuit stated in State Contracting & Engineering Corp. v. Condotte America, Inc., 346 F.3d 1057 (Fed. Cir. 2003) (citing In re Clay, 966 F.2d 656, 658 (Fed. Cir.1992)): "A prerequisite to making a finding on the scope and content of the prior art is to determine what prior art references are pertinent." References within the statutory terms of 35 U.S.C. § 102 (anticipation) can qualify as prior art for an obviousness determination only when analogous to the claimed invention. In re Clay, 966 F.2d 656, 658 (Fed. Cir. 1992). The Federal Circuit restated the test for determining the scope and content of the prior art to be considered for obviousness purposes in In re Bigio as follows:

> Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. In re Deminski, 796 F.2d 436, 442 (Fed. Cir.1986); see also In re Wood, 599 F.2d 1032, 1036 (CCPA 1979).

In re Bigio, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (emphasis added); accord State Contracting, 346 F.3d at 1069. One of ordinary skill in the art would have known of such art because such a person is a hypothetical person who is presumed to be aware of all the pertinent prior art. Custom Accessories, Inc. v. Jeffrey-Allan Industries, Inc., 807 F.2d 955, 962 (Fed. Cir. 1992).

The Wohl article, as its title states, is directed "[t]oward the knowledge of the reaction between nitrobenzene and aniline in the presence of alkali." (CX-2 at 063-119.) It reads in part:

> In the reaction of nitrobenzene with aniline upon addition of alkali, besides a considerable amount of azobenzene, phenazine or phenazine-N-oxide appears, depending on the reaction temperature. This reaction was thus explained, that the nitrobenzene in alkaline solution was converted at first to o-quinone-monoxime, and then to o-nitrosophenol. As was earlier found, in the absence of aniline the latter is oxidized to o-nitrophenol; on the other hand, in the presence of aniline the latter is oxidized to o-nitrophenol; on the other hand, in the presence of aniline, it condenses with aniline to an intermediate, . . . which forms phenazine upon loss of water, or phenazine-N-oxide upon oxidation by excess nitrobenzene.

Id. The article later states:

> Now I have also managed to discover the product of the side reaction in the para position when aniline is present; and this is why so much of the intermediate is obtained, because in contrast to the ortho position, the further condensation with ring-formation is not possible, or is not favored. . . . The experimental evidence, that the reaction at the para position of nitrobenzene leads to a nitroso compound, offers a desired confirmation for the above assumption of an analogous course for the main reaction in the ortho position.

Id. As seen from the foregoing, Wohl was not concerned with a method for producing 4-ADPA or 6PPD and does not disclose that the nitrobenzene and aniline react with one another to produce 4-nitro (p-nitro) or 4-nitroso (p-nitroso) derivatives.

A product of Wohl's side reaction is p-nitrosodiphenylamine (4-NODPA) in which substitution occurred at the para(p) position and Wohl purified a quantity of 4-NODPA which can be calculated as a 3 percent yield. (Bashkin, Tr. at 323-24, 437, 2114-17; Stern, Tr. at 596.) The administrative law judge, however, finds that one of ordinary skill in the art would not be motivated to use the Wohl reaction as a starting point to make 4-ADPA because it primarily taught the production of phenazine and other ortho-substituted products, and because it produced only 3% of p-nitrosodiphenylamine in what Wohl referred to as a "side reaction." The administrative law judge further finds that Wohl does not teach a suitable solvent system, since the "reaction mass," which consists of the reagents aniline, nitrobenzene and sodium hydroxide, becomes "quite hard." (CX-2 at 063-120.) Thus Wohl states that:

> 30 g aniline and 30 g nitrobenzene were mixed with 120 g finely ground, very dry sodium hydroxide and heated in a wide reaction flask in the oil bath to 110-120°. The mass was vigorously stirred with a glass stirrer, turned brown in color after a short time, and then became less viscous at the onset of the reaction. The temperature was then held between 120 and 125°. At this point the reaction mass soon became darker in color, then became viscous and then after some time became quite hard. When the reaction mass is in this condition, one can assume that the reaction has ended. The reaction product, which becomes completely hard upon cooling, is best poured into about 1 liter of water while the reaction mass is still hot.

(CX-2 at 063-120 (emphasis added).) Hence, Wohl defines the reactants (aniline, nitrobenzene and sodium hydroxide) as "the mass" or the "reaction mass." Wohl does not say that the reaction took place in solution. Wohl describes the "reaction mass" as becoming "quite hard." Hence the administrative law judge finds that Wohl's description makes it clear that there was no solvent system throughout the reaction.

The administrative law judge also finds that Wohl does not teach "reacting aniline and nitrobenezene . . . in the presence of . . . a controlled amount of protic material" because Wohl evaporated all of the water from his reaction and did not maintain the minimum amount necessary to maintain selectivity of the desired 4-ADPA intermediates. (Id., CX-1, col. 4, ln. 68-col. 5, ln. 4; col. 14, lns. 21-24; Bashkin, Tr. at 327-328.) As Bashkin testified:

> Q. Can you explain -- withdrawn.
> Does Wohl teach a controlled amount of protic material as that term is used in your patent?
>
> A. No.
>
> Q. Why not?
>
> A. Because he does not maintain a good or even moderate or reasonable selectivity towards the products that are desired in our work. He has a very poor selectivity.
>
> And he runs his reaction at above the boiling point of water, so he is removing water from the reaction. And there is no reason to believe that there is any water present after the reaction has been run at least for a while, even though water is generated by the reaction, it would boil out under these temperatures.
>
> Q. So when you say he doesn't maintain a good or even moderate or reasonable selectivity, how does that relate to the definition of a controlled amount of protic material in the patent?
>
> A. In the patent, we say that the minimum amount of controlled protic material is that which maintains a high selectivity for the desired products.
>
> Q. Now, you have used the term selectivity and I can't remember whether I asked you this before, but what is selectivity?
>
> A. It is the ratio of desired to undesired products, so that's one way of measuring it. It can also be -- well, that's, that's -- let's leave it at that.

(Bashkin, Tr. at 327-28.) In addition, the administrative law judge finds that Wohl did not use a "controlled amount of protic material" because he did not have a "minimum amount of protic material necessary to maintain selectivity of desired products." (CX-1, col. 4, ln. 68 – col. 5, ln. 4.) Wohl's paper indicated he wanted to maintain anhydrous conditions to get nitrobenzene to react with NaOH. (Bashkin, Tr. at 331.)

Based on the foregoing the administrative law judge finds that steps (a) and (b) of the claimed methods in issue are not disclosed in Wohl.

Respondents argued that one skilled in the art would reasonably expect to "successfully use the 4-ADPA intermediate made by the Wohl method to produce 4-ADPA and/or 6PPD." (RRBr at 38.) The administrative law judge finds no merit in the argument since he has found that any 4-ADPA intermediate disclosed in Wohl is not made by methods of the claims in issue. Moreover, there is no evidence in the record that in the 88 years between the publication of Wohl and the time Bashkin began his work (see section IV supra), that anyone in the rubber chemical industry ever considered using the Wohl reaction as a starting point for producing 4-ADPA or 6PPD. The administrative law judge concludes that respondents' suggestion to combine prior art to meet the limitations of the claims in issue is motivated solely by the hindsight accorded one who first viewed the patents in issue. This, of course, is not permissible. As the Court indicated in In re Fritch, 972 F.2d 1260, 1266 n. 15 (Fed. Cir. 1992), it is impermissible to use the claimed invention as an instruction manual or "template" to piece together isolated disclosures and teachings of the prior art so that the claimed invention is rendered obvious.

In addition to the foregoing, the administrative law judge finds objective indicia of nonobviousnesses. A decision was made by movants to build and operate a pilot plant, at a cost of about 15 million dollars, relating to the methods in issue. (Stern, Tr. at 566-567; Rains, Tr. at

707-708.) The pilot plant was essentially "a large research facility that allowed us to prove, from a commercial design perspective . . . how would we best build a commercial facility and also test out some very critical experimental things we needed to understand." (Stern, Tr. 566-567 (emphasis added).) As Stern testified:

> For instance, recycling the tetramethylammonium hydroxide was a critical element to this process from an economical perspective, so we needed to demonstrate and convince ourselves that in fact we could recycle this base, tetramethylammonium hydroxide, and reuse it in the process, so that was just one example. There was a large list of research topics that we needed to focus on and fine-tune for the pilot plant.

(Stern, Tr. at 567.) Thereafter, complainant spent some 80 million dollars building an Antwerp plant for production of 4-ADPA intermediates according to the methods of the claims in issue. (Rains, Tr. at 711.) See Section XI 1 infra.

Based on the foregoing, the administrative law judge finds that respondents have not established, by clear and convincing evidence, that the claimed subject matter in issue is obvious under 35 U.S.C. § 103.

3. Indefiniteness

Respondents argued that Flexsys' proposed claim construction would render the patents in issue fatally indefinite; that, Flexsys' construction of "controlled amount of protic material" imports yield and selectivity limitations which are entirely subjective and are left in the hands of each individual practitioner to determine; and that the case law makes clear that such a subjective claim construction is unacceptable as it is of "unascertainable" scope and fails to notify the public of the scope of a patentee's rights. (RBr at 34, 35, 39-40.)

The staff argued that according to Flexsys, the construction of the term "controlled amount of protic material" is "an amount up to that which inhibits the reaction of aniline with nitrobenzene" and down "to an amount . . . necessary to maintain selectively of the desired products;" and that none of Flexsys's witnesses were able to identify any objective parameters that could be used to determine what constitutes a "controlled amount of protic material." Hence it argued that if Flexsy's construction is adopted, the asserted claims would be indefinite, relying on Datamize v. Plumtree Software, 417 F.3d 1342, 1350 (Fed. Cir. 2005). (SBr at 38-40.)

Complainant argued that it is difficult to imagine patents that have a more complete description of the invention than as disclosed in the patents in issue; that the specifications of said patents provide a very detailed description of the relationship between the suitable solvent system, the suitable base, and the suitable temperature; that the specifications further explain how those reaction variables and others, such as whether the reaction is run under aerobic or anaerobic conditions, can affect the upper and lower limits of the amount of protic material tolerated under specific reaction conditions; and that the examples in the patents in issue provide experimental benchmarks that enable one skilled in the art to practice the invention. (CBr at 77.)

In Energizer Holdings, Inc. v. Int'l Trade Comm'n, 2006 WL171970 at 3 (Fed. Cir. 2006),[37] the Court, citing both Datamize (relied on by the staff) and Exxon Research & Eng'g Co. v. United States, 265 F.3d 1371, 1375 (Fed. Cir. 2001) (relied on by Flexsys), for its analysis of claim indefiniteness under § 112 ¶ 2, stated:

> 35 U.S.C. § 112 ¶ 2 requires that the patent specification shall "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." This provision both facilitates examination during

---

[37] The Court in Energizer reversed the Commission's holding of invalidity on the ground of indefiniteness.

> the patent application stage, and upon grant serves to notify the public of what is patented. The reviewing tribunal must determine whether a person experienced in the field of the invention would understand the scope of the claim when read in light of the specification. See Howmedica Osteonics Corp. v. Tranquil Prospects, Ltd., 401 F.3d 1367, 1371 (Fed.Cir.2005) (claim not indefinite due to ambiguity when meaning readily ascertained from the description in the specification); Personalized Media Communications, LLC v. Int'l Trade Comm'n, 161 F.3d 696, 705 (Fed.Cir.1998). See generally Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed.Cir.2005) (en banc) (claims are construed in the context of the specification and prosecution history, as they would be understood by persons in the same field of endeavor).

(emphasis added.) Thus, the issue before the administrative law judge is whether a person of ordinary skill in the art having at least a masters degree in organic chemistry and some experience in the art of making 4-ADPA and aware of all pertinent prior art would find the claimed term "controlled amount of protic material" indefinite. In view of the specific preferred embodiments (examples) included in the specifications of the '063 and '111 patents, as well as the prosecution history of said patents see supra, the administrative law judge finds that such a person would not find the claimed term in issue indefinite. Thus he finds that the specifications provide a number of examples through controlled experiments that would permit said person to determine the specific upper and lower limits of protic material for a specific set of reaction conditions and that the prosecution history even provides calculations.

Respondents argued that Exxon is distinguishable on its facts. (RRBr at 33-34.) The administrative law judge, however, finds that Exxon supports a holding that the claimed term "controlled amount of protic material" is not indefinite. Thus the Court in Exxon in holding the phrases "for a period sufficient," and "to increase substantially" to be definite, observed that the specification provided some guidelines, even though the specification did not define those claim terms by numerical limits. In this investigation, the administrative law judge finds that the specifications of the '063 and '111 patents provide a number of examples through controlled experiments that permit one skilled in the art to determine the specific upper and lower limits of protic material for a specific set of reaction conditions.

Also, the Court in Exxon, as to the claimed term "substantial absence of slug flow," observed that "[o]ne of skill in the art would understand from the specification that the reason slug flow should be avoided is that it may interfere with reactor efficiency." Thus, the Court concluded:

> Whether there is a "substantial absence of slug flow" therefore can be determined with reference to whether reactor efficiency is materially affected. If there is no slug flow or such minimal slug flow that the slug flow has no appreciable impact on reactor efficiency, then there is a "substantial absence of slug flow" within the meaning of the claims. In this setting, as in others, mathematical precision is not required - - only a reasonable degree of particularity and definiteness.

Id. at 1381.

Similar to the patent in issue in Exxon, the patents in issue in this investigation teach that too much protic material can inhibit the reaction of aniline and nitrobenzene (CX-1, col. 4., lns. 48-50); that the upper limit can be determined by those skilled in the art "utilizing the teachings of the present invention" which includes all of the specific preferred embodiments (the examples) (Id., col. 4, lns. 64-65); and, that the upper limit will vary "for a specific solvent, type and amount of base, base cation and the like." (Id. col. 4, lns. 66-68.) The same is true of the lower limit of protic material, which affects selectivity of the desired products. (Id., col. 4, ln. 68– col. 5, ln. 4.) Thus, the administrative law judge finds that the specifications provide, through the general teaching of the patents in issue (CX-1, col. 4, ln. 61 – col. 5, ln. 4, CX-3, col. 5, lns. 27-65) and through several controlled experiments, a number of benchmarks that inform one skilled in the art the effect of controlling protic material on conversion and selectivity.

The administrative law judge further finds Datamize distinguishable on its facts. In Datamize, in issue was the claimed phrase:

> providing a plurality of pre-defined interface screen element types, each element type defining a form of element available for presentation on said custom interface screens, wherein each said element type permits limited variation in its on-screen characteristics in conformity with a desired uniform and aesthetically pleasing look and feel for said interface screens on all kiosks of said kiosk system, each element type having a plurality of attributes associated therewith, wherein each said element type and its associated attributes are subject to pre-defined constraints providing element characteristics in conformance with said uniform and aesthetically pleasing look and feel for said interface screens . . .

417 F.3d at 1345 (emphasis added). The district court found the term "aesthetically pleasing" indefinite. Before the Court, appellant suggested that the Court adopt a construction that only depends on the subjective opinion of a person selecting features to be included on an interface screen and argued that the district court erred by requiring an objective definition for the phrase "aesthetically pleasing," citing Orthokinetics, Inc. v. Safety Travel Chairs, Inc. 806 F.2d 1565, 1575-76 (Fed. Cir. 1986). In rejecting appellant's argument, the Court in Datamize found that Orthokinetics did not stand for the proposition that the absence of an objective definition for a claim term does not render the term indefinite. The Court in Datamize further concluded that, in stark contrast to Orthokinetics, appellant had offered no objective definition identifying a standard for determining when an interface screen is "aesthetically pleasing." 417 F.3d at 1350-51. In this investigation, the administrative law judge finds that the disclosures of the '063 and '111 patents,

supplemented by the prosecution history, do provide an objective definition for the claimed term "controlled amount of protic material" to a person having a masters degree in organic chemistry and some experience in the art of making 4-ADPA and having awareness of all pertinent prior art. In other words, he finds a person "experienced in the field" of the invention in issue, and not merely a person with no chemical background, would understood the meaning of "controlled amount of protic material" in view of the claims and the specifications of the '063 and '111 patents and the prosecution history.

Based on the foregoing, the administrative law judge finds that respondents have not established by clear and convincing evidence, that the claimed term "controlled amount by protic material" is indefinite.

XI. Domestic Industry Requirements

There can be a violation of section 337 "only if an industry in the United States, relating to articles protected by the patent ... exists or is in the process of being established." 19 U.S.C. § 1337(a)(2); see also Certain Methods of Making Carbonated Candy Products, Inv. No. 337-TA-292, USITC Pub. 2390, (Mar. 1990). The existence of a domestic industry is measured at the time the complaint is filed. See Bally/Midway Mfg. Co. v. U.S. Int'l Trade Comm'n, 714 F.2d 1117, 1121-22 (Fed. Cir. 1983).

The Commission has established a two-prong test for determining whether a complainant has satisfied the domestic industry requirement. The technical prong considers "whether the complainant is exploiting or practicing the patent in controversy," while the economic prong addresses "whether there is significant or substantial commercial exploitation." Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including

Self-Stick Repositionable Notes, Inv. No. 337-TA-366, USITC Pub. 2949 (Jan. 1995). As the complainant, Flexsys bears the burden of proving that it has satisfied both the technical prong and the economic prong.

By Order No. 28 (October 13, 2005), the administrative law judge made an initial determination that complainant met the economic prong of the domestic industry requirement. By notice dated November 1, 2005, the Commission determined not to review Order No. 28.

1. Technical Prong

Complainant Flexsys argued that it produces 4-ADPA at the plant in Antwerp; that it practices the process for producing 4-ADPA covered by claim 30 of the '063 patent and claim 7 of the '111 patent; and that it ships the 4-ADPA from Antwerp to its plant in Sauget, Illinois, where it alkylates it to produce 6PPD. Hence, it argued that between the steps practiced in the Antwerp plant and the alkylation step practiced in Sauget, Illinois, Flexsys is practicing claim 61 of the '063 patent and claim 11 of the '111 patent. (CBr at 58.)

Each of respondents and the staff argued that Flexsys failed to demonstrated that it is practicing either the '063 or '111 patents; that the amount of water in Flexsys' coupling reaction is 8.5% by weight at the end of the coupling reaction when aniline is the solvent; that the patents in issue disclose an upper limit of water "up to about 4%" when aniline is used as the solvent; and that since the amount of water used in Flexsys process is significantly higher than the "up to about 4%" water limitation disclosed in the asserted claims of the '063 and '111 patents, Flexsys' process does not practice the '063 and '111 patents. (RBr at 66; SBr at 33.)

Flexsys produces 4-ADPA at the plant in Antwerp. (CFF 364 (undisputed).) Flexsys NV owns the equipment at the Antwerp plant and Flexsys America directs the production of 4-ADPA at the Antwerp plant. (CFF 365 (undisputed).) To produce 4-ADPA, Flexsys brings aniline and nitrobenzene into reactive contact and that reaction occurs in a suitable solvent system. (CFF 366 (undisputed).) In the coupler, aqueous base is brought in and, under vacuum, water is distilled off to about 30 percent base solution. (CFF 368 (undisputed).) The base that is used in the coupler is a combination of tetramethylammonium hydroxide and tetramethylammonium carbonate. (CFF 369 (undisputed).)

After the base has been concentrated to about 30 percent, aniline is charged in and more water is distilled off of the base and aniline mixture. (CFF 370 (undisputed).) Once there is about 23 percent water to base, nitrobenzene is charged into the reactor over a two hour period, but distillation of water and aniline mixture continues. (CFF 371 (undisputed).) The temperature of the batch as nitrobenzene is fed into the reactor begins at "72 degrees" and during the course of the nitrobenzene introduction, as water is removed, the batch heats up to "82 degrees." (CFF 372 (undisputed).) After the two hour period to charge the nitrobenzene, there is a 30 minute hold period during which water is still pulled off. (CFF 373 (undisputed).) Water is removed during the 30 minute hold period to control protic material and maintain selectivity as well as drive the reaction to completion. (CFF 374 (undisputed).) At the end of the 30 minute hold period, the reaction is completed. (CFF 375 (undisputed).) At the completion of the reaction, the water to base ratio is about 2.6 and the water content is about 8.5 percent. (CFF 376 (undisputed).) The reaction converts about 99 percent of the nitrobenzene added. (Fields, Tr. at 830.) At the completion of the reaction about 91 percent of the batch is 4-ADPA intermediates and the rest containing impurities, mostly azobenzene. (Fields, Tr. at 830.) The azobenzene is recovered and converted back to aniline. (CFF 379 (undisputed).)

From the coupler, the batch goes into the hydrofeed tank so that another batch can be processed in the coupler. (CFF 380 (undisputed).) From the hydrofeed tank, the batch is fed into the hydrogenation reactor. (CFF 381 (undisputed).) In the hydrogen reactor, catalyst and hydrogen are added to reduce the 4-ADPA intermediates to 4-ADPA. (CFF 382 (undisputed).) 4-ADPA made in the Antwerp plant is sent for alkylation in three plants: Krummrich, in Sauget, Illinois, Antwerp and Brazil. (CFF 383 (undisputed).) The 4-ADPA made in Antwerp comes to the Krummrich plant by boat. (CFF 384 (undisputed).) The alkylation at Krummrich converts 4-ADPA into para-phenylenediamine (6PPD). (CFF 385 (undisputed).)

Based on the foregoing, and the proper interpretation of the claimed term "controlled amount of protic material," the administrative law judge finds that complainant has established that it practices the methods of claims 30 and 61 of the '063 patent and the methods of claims 7 and 11 of the '111 patent. Hence, he finds that complainant has met its burden in satisfying the technical prong of the domestic industry requirement.

XII. KKPC's Licensing And Estoppel Defense

Respondent KKPC asserted that two separate grounds exist by which the patents in issue should not be enforced against it; that KKPC holds a license; that at a minimum, KKPC has the right to continue performing the "non-novel" step of reductive alkylation on 4-ADPA, exactly the same process performed by Kumho-Monsanto, Inc. (KMI) during the term of the Technology and Licensing Agreement (TALA); that the evidence established that the "PPD2" technology, which was developed during the term of the TALA, was "continuing know-how" that Monsanto was required to supply to KMI; and that in addition, KMI has a license under Monsanto's Korean patent pursuant to a separate provision of the TALA providing KMI with a license to "future"

Korean patents. It is also argued that Flexsys should be estopped from enforcing the '063 and '111 patents against KKPC based on Flexsys' conduct in: 1) convincing KMI to not rebuild its 4-ADPA facility and 2) failing to live up to is promise to provide KMI with the patented PPD2 technology. (RBr at 92-93.)

Complainant argued that respondent KKPC is not entitled to practice the patents-in-issue and that complainant is not legally estopped from enforcing the patents in issue against KKPC. (CBr at 48-67.)

The staff essentially agrees with complainant, but argued that while "it appears that KKPC does not have a right to practice elements relating to the process of making 4-ADPA, KKPC does have the authority to convert 4-ADPA obtained from any source into 6PPD at the same plant and using the same processes previously used by KMI." (SBr at 40-41; SRBr at 13-15.)

It is a fact that Monsanto and KKPC agreed to form a joint venture to which Monsanto would contribute its then-latest technology concerning the production of 4-ADPA and 6PPD. (RFF 9.8 (undisputed).) Both Monsanto and KKPC contributed cash to the joint venture. (RFF 9.11 (undisputed).) The Joint Venture Agreement (JVA) between Monsanto and KKPC was signed June 12, 1987. (RFF 9.12 (undisputed).) The JVA between Monsanto and KKPC took effect November 1, 1987. (RFF 9.13 (undisputed).) The joint venture between Monsanto and KKPC was named Kumho-Monsanto, Inc. (KMI). (RFF 9.14 (undisputed).) KMI was owned 50/50 by Monsanto and KKPC through equal stock subscriptions. (RFF 9.15 (undisputed).) The initial entity formed to create the joint venture was named K-M Chemical Co. Ltd. (RFF 9.16 (undisputed).) The JVA specified that upon the closing of the transaction, K-M Chemical Co. would be renamed Kumho-Monsanto, Inc. (RFF 9.17 (undisputed).)

The JVA contemplated that, as part of the transaction, KMI would purchase all of KKPC's existing rubber chemicals business, as well as build a new 4-ADPA plant and modify KKPC's existing 6PPD unit, using technology to be supplied to KMI by Monsanto pursuant to another agreement known as the Technology and Licensing Agreement (TALA). (RFF 9.21 (undisputed).) The JVA had no termination date and the joint venture was to continue indefinitely until terminated under Article 12.2 (for breach, bankruptcy, etc.) or until either party sold its interest in KMI to a third party or the other. (RFF 9.22 (undisputed).) Neither party could transfer its interest in KMI, except to an "affiliate" (as defined in the JVA), for a period of ten years without the other's consent, except that Monsanto could do so at an earlier time if it had determined to cease its own rubber chemicals business. (RFF 9.23 (undisputed).) "Affiliate" under the JVA is defined as "any entity directly or indirectly controlling a party to this Agreement or any entity directly or indirectly controlled by any such controlling entity,"while entity means any natural person or any other person recognized by law and "controlled" means possession, direct or indirect, of the power to direct or cause direction of the management and policies of an entity. (RFF 9.24 (undisputed).) Prior to a party's sale of its interest in KMI to a third party, the other party was to have a right of first refusal. (RFF 9.26 (undisputed).) The JVA included a valid assignment clause wherein neither party could assign or transfer its rights under the JVA, nor its shares to the Joint Venture company, without the other parties' written consent. (CFF 528 (undisputed).) The JVA specifies it is to be governed by Korean law. (RFF 9.27 (undisputed).) The JVA and associated agreements were written in English. (CFF 527 (undisputed).) The JVA terminated on October 31, 2001. (CFF 538 (undisputed).)

The TALA recites that KMI would be acquiring KKPC's existing rubber chemicals business, building a new 4-ADPA plant and modifying KKPC's existing PPD unit. (RFF 9.28 (undisputed).) The TALA further recites that Monsanto has "valuable secret TECHNICAL INFORMATION related to the manufacture and use of [4-ADPA] and certain [PPD PRODUCTS]" which it was willing to license KMI to "manufacture, use and sell NEW 4-ADPA, and modify EXISTING PPD PROCESSES so as to increase their capacity." (RFF 9.29 (undisputed).) The TALA has a ten-year term. (RFF 9.30 (undisputed).) The TALA took effect on November 1, 1987 and terminated on October 31, 1997. (RFF 9.31 (undisputed).) Article 2.01 of the TALA provides:

> MONSANTO shall furnish LICENSEE with sufficient TECHNICAL INFORMATION in the matter set forth in this ARTICLE II to enable LICENSEE to design, construct, operate and maintain the NEW 4-ADPA PLANT and to modify EXISTING PPD PROCESSES to increase their capacity. LICENSEE understands that certain NEW 4-ADPA PROCESSES and NEW 4-ADPA EQUIPMENT is developmental in nature and as of the DATE OF THIS AGREEMENT has not been commercialized by MONSANTO or any MONSANTO AFFILIATE, however, the Board of Directors of MONSANTO have approved the installation of this developmental technology in the Brazilian plant of a MONSANTO AFFILIATE. (CX 159).

Article 4.01 of the TALA is entitled "Continuing Know-How." (RFF 9.32 (undisputed).) Article 4.01 of the TALA provides:

> MONSANTO shall, during the TERM OF THIS AGREEMENT, make available to [KMI] improvements in TECHNICAL INFORMATION within the FIELD OF THIS AGREEMENT which improvements Monsanto or a MONSANTO AFFILIATE has commercialized in their commercial facilities for the manufacture of PPD PRODUCTS or NEW 4-ADPA." (RX-506C at KKPC-ITC 04756, Article 4.01.)

(RFF 9.33 (undisputed).) Article 4.03 of the TALA provides:

> During the TERM OF THIS AGREEMENT, MONSANTO shall permit representatives of LICENSEE, and LICENSEE shall permit representatives of MONSANTO to inspect, examine, study and discuss respectively MONSANTO's (including MONSANTO AFFILIATES) and LICENSEE's commercial facilities, machinery, equipment (including detailed engineering drawings thereof) manufacturing processes and related control laboratories to the extent that such facilities are engaged in the commercial production of PPD PRODUCTS or NEW 4-ADPA.

(RFF 9.34 (undisputed).) The license grant is set forth in Article VI of the TALA. (RFF 9.36 (undisputed).) Article 6.01 of the TALA provides:

> Subject to the provisions of ARTICLES VII and XV herein, MONSANTO agrees to grant and does hereby grant to LICENSEE an exclusive, non-transferable, royalty-free license, without the right to sublicense, to use all TECHNICAL INFORMATION and improvements thereto which MONSANTO supplies pursuant to this Agreement for the sole purpose of making NEW 4-ADPA only in the NEW 4-ADPA plant and PPD PRODUCTS only in the PLANT and using or selling such NEW 4-ADPA and PPD PRODUCTS, except to the extent that such use or sale is precluded by any unexpired patents of MONSANTO." (RX-506C at KKPC-ITC 04758-59, Article 6.01.)

(RFF 9.37 (undisputed).) The PLANT is defined in the TALA as "the battery limits facilities of LICENSEE in Yeochun the Republic of Korea…." (RFF 9.39 (undisputed).)

Article 6.03 of the TALA provides:

> Subject to the provisions of ARTICLES VII and XV herein, MONSANTO agrees to grant and hereby grants to LICENSEE an exclusive, non-transferable royalty-free license under and for the full terms of all future Korean patents owned or controlled (in the sense of having the right to grant licenses thereunder) by MONSANTO during the term of this Agreement to the extent, but only to the extent, necessary for LICENSEE (1) to use in the NEW 4-ADPA PLANT and in the PLANT all TECHNICAL INFORMATION and improvements thereto within THE FIELD OF THIS AGREEMENT which MONSANTO supplies to LICENSEE pursuant to this Agreement and improvements to such

> TECHNICAL INFORMATION made by LICENSEE; and (2) to use and sell the NEW 4-ADPA and PPD PRODUCTS so produced."

(RFF 9.40 (undisputed).) Monsanto's only commercial process for making 4-ADPA existing at the time the TALA was entered into was called PNCB. (CFF 553 (undisputed).) All rights under the TALA were conveyed as an exclusive license from Monsanto to KMI during the term of the TALA. (CFF 556 (undisputed).) The licenses granted under the TALA survive the expiration of the TALA but become non-exclusive at that point. (RFF 9.41 (undisputed).) The terms of the TALA are to be governed by Korean law. (RFF 9.43 (undisputed).)

A technical assistance agreement (TAA) was an appendix to the TALA and sets forth the technical information, technical assistance, advice, consultation and training to be provided to KMI by Monsanto with regard to the NEW 4-ADPA PLANT, MODIFIED PPD PROCESSES, and the PLANT study only. (RX-560C at KKPC-ITC 04775.) The TAA sets forth the specifications for the New 4-ADPA Plant. (CX-160, § 2.08; Crowley, Tr. at 2224.) Under the TAA, the New 4-ADPA Plant was to be a 2,000 metric ton per year plant, using aniline and p-nitrochlorobenzene. (CX-160, § 2.08; Crowley, Tr. at 2224-25.) KMI decided to defer construction of the New 4-ADPA Plant until such time as the business circumstances indicate a commercial need for a new plant. (CFF 565 (undisputed).) Ultimately, the new 4-ADPA plant where all New 4-ADPA production was to take place, was never built. (Crowley, Tr. at 2225.)

Prior to the time the JVA and TALA were signed, KKPC produced both 4-ADPA (also known as PADA) as well as 6PPD. (RFF 9.44 (undisputed).) Until 1995, KMI produced both 4-ADPA and 6PPD. (RFF 9.45 (undisputed).) 4-ADPA was produced in one unit of KMI's Yeochun, Korea plant. (RFF 9.46 (undisputed).) Reductive alkylation of 4-ADPA into 6PPD took place in a different unit of KMI's Yeochun, Korea plant. (RFF 9.47 (undisputed).) KMI used{

} In its 6PPD unit, KMI performed reductive alkylation to convert 4-ADPA to 6PPD. (RFF 9.49 (undisputed).) Reductive alkylation was a well-known process in the industry to convert 4-ADPA to 6PPD. (RFF 9.50 (undisputed).)

The administrative law judge finds that the evidence adduced at the hearing demonstrates that KKPC does not have a license under the patents at issue. Thus, even if KKPC succeeded to KMI's rights under the TALA, the TALA provided only rights to Monsanto's commercial process for making 4-ADPA that existed at the time of the agreement, and improvements to said process. (RX-506, §4.1 at KKPC-ITC-04756 (Improvements, TALA) <u>supra</u>; §2.08(b) at KKPC-ITC-04778 (Technical appendix); Crowley, Tr. at 2219-20, 2225.)[38] Therefore, the administrative law judge finds that KMI did not expressly have rights to "improvements" that consist of replacement of the existing commercialized technology by a totally <u>new</u> technology. In 1987, Monsanto's existing technology for the production of 4-ADPA involved p-nitrochlorobenzene and formanilide as starting materials. (RFF 9.56 (undisputed)); <u>see</u> <u>also</u> Section IV, <u>supra</u>. The administrative law judge finds that the PPD2 process, which is the process described in the '063 and '111 patents in issue (RFF 9.59 (undisputed)), was not an "improvement" of an existing process, as that term is used in Paragraph 4.1 of the TALA, but a completely different process. (Crowley, Tr. at 2241)(CFF 606). Thus, as the '063 and the '111

---

[38] See also §1.11 -{

}

RX 506, §1.11 at KKPC-ITC-04747 (emphasis added).

patents disclose, the PPD2 process solved environmental and economic problems. (CFF 605 (undisputed).)

In addition, KMI would only have rights to such technology if such technology were commercialized by Monsanto or an affiliate thereof prior to October 31, 1997. The evidence of record demonstrates that the PPD2 process was commercialized in 1998 subsequent to the relevant date, and which was after the October 31, 1997 termination date of the TALA. (Rains, Tr. at 2194; CX-202 at FA070136.)

Referring to KKPC's estoppel argument, the administrative law judge finds that KMI did not rely on assurances that{ }[39] (Lim, Tr. at 1569.) Moreover,{ } (Crowley, Tr. at 2229.) In addition, KMI's Park did propose that{ } (RX-531 at KKPC-ITC 00527; CX-166.) However, Monsanto{ } (Lim, Tr. at 1612-15.)

As to any promise to provide KMI with the patented technology, the JVA and the TALA contained entirety clauses which required any agreements or arrangements between the parties to be in writing (CX-158 at KKPC-ITC 04172, 04770) and further contained a clause requiring all amendments to the JVA or TALA to be in writing and signed by an authorized representative of

---

[39] On January 3, 1995, KMI had a fire in its existing 4-ADPA plant. (CFF 582 (undisputed).) The fire destroyed the 4-ADPA production facility but did not disrupt PPD production at the plant. (CFF 583 (undisputed).)

each party, thus any agreements not signed by an authorized representative were invalid. (CX-158 at KKPC-ITC 04172, 04771). No such documents are in evidence.

Based on the foregoing, the administrative law judge finds that KKPC has not established that it has a licensing and estoppel defense.[40]

XIII. Remedy And Bonding

Under Commission rule 210.42(a)(1)(ii), the administrative law judge is to consider the issues of remedy and bonding and issue a recommended determination thereon. The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding. See Certain Condensers, Parts Thereof and Products Containing Same, Including Air Conditioners for Automobiles, Inv. No. 337-TA-334 (Remand), Comm'n Op. (Sept. 10, 1997) (citing Viscofan, S.A. v. ITC, 787 F.2d 544, 548 (Fed. Cir. 1986)). When a section 337 violation has been found, the Commission has the authority, with respect to the imported articles concerned, to enter an exclusion order, a cease and desist order, or both. 19 U.S.C. § 1337(d) and (f).

1. Exclusion Order

Complainant argued that the evidence justifies a permanent limited exclusion order under 19 U.S.C. § 1337(d) to protect its domestic industry from the importation and sale by respondents of 6PPD produced by Sinorgchem and KKPC using processes covered by the

---

[40] The administrative law judge finds the issue of whether KKPC has any right to convert 4-ADPA obtained from any source into 6PPD using the same processes previously used by KMI irrelevant to complainant's allegations of infringement of the claims in issue by KKPC which claims also involve a method for producing the 4-ADPA intermediates. Moreover, the administrative law judge has found that the complainant has not established any violation of section 337 by KKPC. See supra, Section IX 3.

patents-in-issue; and that the limited exclusion order should be extended to cover 4-ADPA that Sinorgchem produces using the processes covered by the patents in issue. It is also argued that, in addition to halting importation of infringing 6PPD manufactured by or on behalf of Sinorgchem or KKPC, or imported by or on behalf of Sinorgchem, KKPC, and Sovereign, the exclusion order also should cover each respondents' affiliated companies, parents, subsidiaries, or other related business entities, or any of their successors or assigns; that as there is the possibility that non-infringing products may be produced abroad and imported into the United States by respondents, complainant does not oppose a certification process and such certification can be provided for in the limited exclusion order with procedures for certification to be specified by the Bureau of Customs and Border Protection. It is further argued that the exclusion order should include 4-ADPA produced by Sinorgchem. (CBr at 110-12.)[41]

Respondents argued that should a remedy be required, the appropriate remedy would be a limited exclusion order directed solely at imported 4-ADPA and 6PPD.[42] (RBr at 108.)

The staff argued that if a violation were found, an order should issue directed solely to the exclusion of 4-ADPA and 6PPD made by or on behalf of one or more of the respondents determined to be using a process covered by an asserted claim. (SBr at 42.)

Based on the arguments of the parties, the administrative law judge recommends that limited exclusion orders issue directed to each of Sinorgchem, as to all of the claims in issue, and Sovereign, as to claim 61 of the '063 patent and claim 11 of the '111 patent. Morever, he

---

[41] Complainant represented that the parties agreed that any remedy not include cease and desist orders. (CRBr at 67.)

[42] Respondents noted that the parties have entered into a stipulation (SX-6) in which complainant has agreed that it is not seeking relief against downstream products. (RBr at 108.)

recommends that said orders apply not only to said respondents but also to any of the affiliated companies, parents, subsidiaries, licensees, contractors, or other related business entities, or successors or assigns of said respondents. See, Limited Exclusion Order which issued on February 16, 2005, in Certain Audio Digital-To-Analog Converters And Products Containing Same Inv. No. 337-TA-499 ("limited exclusion order applies to any of the affiliated companies, parents, subsidiaries, licensees, contractors, or other related business entities, or their successors or assigns, of ...[respondent]"). Since there are only method claims in issue, the administrative law judge also recommends a certification provision to permit Customs to determine whether any importation falls within the limited exclusion order.

2. Bond

If the Commission determines to enter an exclusion order and/or cease and desist order, then the affected articles shall still be entitled to entry under bond during the 60-day Presidential review period. The amount of such bond must "be sufficient to protect the complainant from any injury." Commission rule 210.50(a)(3); see also 19 U.S.C. § 1337(j)(3). The Commission may set the bond amount at a substantial level because the review period is relatively short and the consequences are likely to be short-lived. See Certain Toothbrushes and the Packaging Thereof, ITC Inv. No. 337-TA-391, Comm'n Op. on Remedy, The Public Interest, and Bonding, 1997 WL 696291 (Oct. 15, 1997). The Commission frequently sets the bond by attempting to eliminate the difference in sales prices between the patented domestic product and the infringing product. See, e.g., Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes, ITC Inv. No. 337-TA-366, Comm. Op. at 24 (1996).

Complainant argued that there is insufficient price information on record to compare sales prices; that in the absence of reliable price information, the Commission has used other methods to determine an appropriate bond, such as a reasonable royalty rate. Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus, Inv. No. 337-TA-337, Comm'n Op. at 41 (1993); that complainant does not license the patents in issue other than to related parties, and therefore there is no reliable royalty information upon which to calculate a reasonable royalty rate for unrelated third-parties; and that in investigations where other methods of formulating the bond amount are unreliable, a bond of 100% has been imposed, citing e.g., Certain NAND Flash Memory Circuits and Products Containing Same, Inv. No. 337-TA-382, Comm'n Op. at 27 (USITC Pub. 3046 (1997)); Certain Semiconductor Memory Devices and Products Containing Same, Inv. No. 337-TA-414, Recommended Determination on Remedy and Bonding, (Dec. 13, 1999). Hence, complainant contended that a bond in the amount of 100% is appropriate and is necessary to protect it from injury. (CBr at 115.)

Respondents argued that they are very small players in the overall market for 4-ADPA and 6PPD; that from 2001-2004, KKPC did not sell any product into the United States, (JX-25C Suh Dep. at 45-46); that since that time, KKPC has sold 6PPD to Michelin North America in the United States, (JX-25C Suh Dep. at 64:3-19); that there is no evidence, that respondents have obtained any competitive advantage from their alleged activities. It is argued that complainant has failed to offer any evidence as to its prices or those of respondents upon which a comparative analysis could be made; that complainant should not be permitted to simply decline to put on a case as to the appropriate bond then ask the Commission to impose a "generic" bond due to lack of information; that to the extent that the Commission is unable to determine an appropriate bond, it is because complainant has failed to provide the Commission with the necessary information to calculate an appropriate bond; and that accordingly, there should be no bond requirement in this investigation.

The staff argued that while complainant failed to present any evidence at the hearing, with respect to the requisite bond, given the "dearth" of information in the record, the staff does not oppose the imposition of a bond of 100% during the Presidential review period.

The level of the bond should be sufficient to "offset any competitive advantage resulting from the unfair method of competition or unfair act enjoyed by persons benefitting from the importation." Certain Dynamic Random Access Memories, Components Thereof and Products Containing Same, Inv. No. 337-TA-242, Comm'n Op. on Violation, Remedy, Bonding and the Public Interest, (USITC Pub. 2034 (1987)). The administrative law judge finds no evidence in the record to support any bond to offset any competitive advantage resulting from the unfair acts of Sinorgchem and Sovereign from their importations. Hence, he does not recommend the imposition of a bond during the 60-day Presidential period.

XIV. Additional Findings Of Fact

1. Complainant Flexsys America L.P. (Flexsys) is a limited partnership organized and existing under the laws of the state of Delaware. Flexsys' principal place of business is 260 Springside Drive in Akron, Ohio 44334-0444. (Complaint ¶ 6)

2. Flexsys was formed in May 1995 as the result of a joint venture of the rubber chemical businesses of Monsanto and Akzo Nobel. (Rains, Tr. at 673; Crowley, Tr. at 2230, 2249.)

3. Sinorgchem is a Chinese manufacturer and supplier of rubber chemicals, including rubber antidegradants. (Wang, Tr. at 1124.)

4. Sinorgchem's current annual sales are{ } Renminbi Yuan (the Chinese currency), which is { } U.S. Dollars. (Wang, Tr. at 1221.)

5. Wang Nongyue, the General Manager of Sinorgchem, testified at the hearing. (Wang, Tr. at 1121.)

6. Wang is responsible for Sinorgchem's production, manufacturing and research and development. (Wang, Tr. at 1121.)

7. Sinorgchem was formed in 1998. (Wang, Tr. at 124.)

8. Sinorgchem manufactures and sells "4-ADPA, IPPD and 6PPD." (Wang, Tr. at 1124-26.)

9. 4-ADPA is used to make "IPPD and 6PPD," as well as being a dye intermediate. (Wang, Tr. at 1127; Rains, Tr. at 703, 766.)

10. 4-ADPA is also an intermediate for dyes, pharmaceuticals and photographic chemicals. (RX-849 at p.3; RX-854, col. 9, lns. 61-62.)

11. 6PPD is a tire antidegradant and petroleum stabilizer. (Wang, Tr. at 1127.)

12. Sinorgchem also refers to 4-ADPA as RT Base. (Wang, Tr. at 1126.)

13. Besides manufacturing 4-ADPA, Sinorgchem also purchases 4-ADPA from third parties. (Wang, Tr. at 1126-1127; SX-3.)

14. Sinorgchem sells its products to tire companies and rubber products manufacturing companies. (Wang, Tr. at 1127.)

15. Sinorgchem manufactures 4-ADPA, IPPD and 6PPD at its plant in Cao County in the Shandong Province of the People's Republic of China. (Wang, Tr. at 1124.)

16. Respondent Korea Kumho Petrochemical Co., Ltd. (KKPC) is a corporation formed under the laws of the Republic of Korea headquartered in and having a place of business at Kumho Building, #57 Shinmunro 1-Ga, Seoul, Korea. (Complaint ¶ 11.)

17. KKPC produces synthetic rubbers, synthetic resins, and semiconductor-related chemicals in addition to rubber chemicals. (Lim, Tr. at 1510-1511.)

18. Respondent Sovereign Chemical Company (Sovereign) is a corporation having a principal place of business at 1225 West Market Street, Akron, Ohio 44313. (Response to Complaint at 5.)

19. Sovereign imported into the United States for distribution 6PPD purchased from Sinorgchem, but has not imported 6PPD purchased from KKPC. (JX-34C Guo Dep. at 45-60; RX-377; RX-454C; RX-461C; RX 462C; RX-463C; RX-464C; RX-466C; SX-5.)

20. Sovereign is not a manufacturer or producer of 4-ADPA or 6PPD. (JX-34C Guo Dep. at 45-60; RX-377; RX-454C; RX-461C; RX 462C; RX-463C; RX-464C; RX-466C.)

21. Sovereign has not imported for distribution in the United States 4-ADPA purchased from either Sinorgchem or KKPC. (JX-34C Guo Dep. at 45-60; RX-377; RX-454C; RX-461C;

RX-462C; RX-463C; RX-464C; RX-466C; SX-5.)

CONCLUSIONS OF LAW

1. The Commission has in rem jurisdiction and in personam jurisdiction.

2. There has been an importation of certain accused rubber antidegradants, components thereof, and products containing same which are the subject of the alleged unfair trade allegations.

3. An industry does exist in the United States, as required by subsection (a)(2) of section 337, that exploits certain rubber antidegradants, components thereof, and products containing same that are covered by the '063 patent and the '111 patent.

4. The accused process of respondent Sinorgchem infringes the asserted claims.

5. The asserted claims of the '063 patent and the '111 patent are not invalid.

6. There is a violation of section 337 by respondents Sinorgchem and Sovereign.

7. There is no violation of section 337 by respondent KKPC.

8. The record supports issuance of limited exclusion orders.

9. The record does not support imposition of any bond during the Presidential review period.

ORDER

Based on the foregoing, and the record as a whole, it is the administrative law judge's Final Initial Determination that there is a violation of section 337 in the importation into the United States, sale for importation, and the sale within the United States after importation of certain rubber antidegradants, components thereof, and products containing same. It is also the administrative law judge's recommendation that limited exclusion orders should issue directed to respondents Sinorgchem and Sovereign. He does not recommend that any bond be imposed during the Presidential review period.

The administrative law judge hereby CERTIFIES to the Commission his Final Initial and Recommended Determinations together with the record consisting of the exhibits admitted into evidence. The pleadings of the parties filed with the Secretary and the transcript of the pre-hearing conference and the hearing, are not certified since they are already in the Commission's possession in accordance with Commission rules.

Further, it is ORDERED that:

1. In accordance with Commission rule 210.39, all material heretofore marked in camera because of business, financial and marketing data found by the administrative law judge to be cognizable as confidential business information under Commission rule 201.6(a) are to be given in camera treatment continuing after the date this investigation is terminated.

2. Counsel for the parties shall have in the hands of the administrative law judge those portions of the final initial and recommended determinations which contain bracketed confidential business information to be deleted from any public version of said determinations no later than March 3, 2006. Any such bracketed version shall not be served by fax on the

administrative law judge. If no such bracketed version is received from a party, it will mean that the party has no objection to removing the confidential status, in its entirety, from these initial and recommended determinations.

3. The initial determination portion of the Final Initial and Recommended Determinations, issued pursuant to Commission rule 210.42(h)(2), shall become the determination of the Commission forty-five (45) days after the service thereof, unless the Commission within that period shall have ordered its review of certain issues therein or by order has changed the effective date of the initial determination portion. The recommended determination portion, issued pursuant to Commission rule 210.42(a)(1)(ii), will be considered by the Commission in reaching a determination on remedy and bonding pursuant to Commission rule 210.50(a).

Paul J. Luckern

Paul J. Luckern
Administrative Law Judge

Issued: February 17, 2006

CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME

Investigation No. 337-TA-533

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **Public Version Final Initial and Recommended Determinations** was served by hand upon Commission Investigative Attorney Juan Cockburn, Esq. and upon the following parties via first class mail, and air mail where necessary, on `April 25, 2006`.

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street, SW - Room 112
Washington, DC 20436

For Complainant Flexsys America LP:

Gregory C. Dorris, Esq.
Charles H. Carpenter, Esq.
Pepper Hamilton LLP
Hamilton Square
600 14th Street, NW
Washington, DC 20005-2004

Eric C. Cohen, Esq.
Charles R. Krikorian, Esq.
Katten Muchin Rosenman LLP
535 West Monroe Street
Chicago, IL 60661-3693

Gary Ropski
Brinks Hofer Gilson & Lione
NBC Tower
455 North Cityfront Plaza
Suite 3600
Chicago, IL 60611

CERTIFICATE OF SERVICE page 2

For Respondent Korea Kumho Petrochemical Co., Ltd.:

V. James Adduci II
Barbara A. Murphy
Adduci, Mastriani & Schaumberg, LLP
1200 Seventeenth Street, NW
Washington, DC 20036

Robert G. Badal
Edward J. Slizewski
Heller Ehrman LLP
333 S. Hope Street
Suite 3900
Los Angeles, CA 90017-3043

Alan H. Blankenheimer
Heller Ehrman LLP
4350 La Jolla Village Drive, 7th Floor
San Diego, CA 92122

Guy W. Chambers
Maureen Sheehy
Townsend and Townsend and Crew
Two Embarcadero Center
Eighth Floor
San Francisco, CA 94111

For Respondent Sovereign Chemical Company:

James K. Kearney
Womble Carlyle Sandridge & Rice LLP
1401 I Street, NW, 7th Floor
Washington, DC 20005

Nanda K. Alapati
Womble Carlyle Sandridge & Rice LLP
8065 Leesburg Pike, 4th Floor
Tysons Corner, VA 22182-2738

Deborah A. Coleman
Hahn Loeser & Parks LLP
3300 BP Tower
200 Public Square
Cleveland, OH 44114

Scott M. Oldham
John J. Cunniff
Hahn Loeser & Parks LLP
One GOJO Plaza, Suite 300
501 S. Main Street
Akron, OH 044311-1076

For Respondent Sinorgchem Co., Shandong:

Paul J. Zegger
Arnold & Porter, LLP
555 12th Street, NW
Washington, DC 20004

Shanlon Wu
King and Wood PRC Lawyers
31st Floor, Tower A, Jianwei SOHO,
39 Dongsanhuan Zhonglu
Chaoyang District, Beijing 100022
People's Republic of China

Manni Li
Venable LLP
575 7th Street, NW
Washington, DC 20004

Marcia H. Sundeen, Esq.
1700 Pennsylvania Avenue, NW
Suite 400
Washington, DC 20006

CERTAIN RUBBER ANTIDEGRADANTS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING SAME

Investigation No. 337-TA-533

PUBLIC MAILING LIST

Sherry Robinson
LEXIS-NEXIS
8891 Gander Creek Drive
Miamisburg, OH 45342

Ronnita Green
West Group
Suite 230
901 Fifteenth Street, NW
Washington, DC 20005

(PARTIES NEED NOT SERVE COPIES ON LEXIS OR WEST PUBLISHING)