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CUSTOMS
LABORATORY
BULLETIN

Contents

Volume 8 Number 1
April 1996

CUSTOMS
LABORATORY
BULLETIN

EDITOR'S PAGE
Volume 8 Number 1
April 1996

Welcome to the April 1996 issue of the Customs Laboratory Bulletin!

The Customs Laboratory Bulletin is published in January, April, July and October of each year, provided that we receive a sufficient number of articles from you, our readers. As you may have noticed, there were no issues for October 1995 and January 1996. We simply did not have enough material. To maintain a quarterly publication schedule, we need your help.

The Customs Laboratory Bulletin is looking for articles dealing with intriguing samples, innovative methods of analysis, and other topics of interest to the Customs and related laboratory fields. Our articles are peer-reviewed prior to publication and range in length from short notes to full length reports on major research projects. Our primary focus is on analytical problems encountered by Customs chemists and analysts worldwide.

Instructions for preparing articles for submission can be found on page 27 of this issue. For further information on submitting an article, to request a subscription, or to share comments and suggestions on how the Customs Laboratory Bulletin could better serve your needs, please contact the Editor at the following address:

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CUSTOMS
LABORATORY
BULLETIN

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A SOFTWOOD SEARCH COMPUTER PROGRAM

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INTRODUCTION

The identification of softwood (coniferous) species is important to U.S. Customs in order to help determine the entered tariff classification. Wood can be identified by observing microscopic anatomical features of thin sections in the plane of the cross section, the radius, and the tangent. These microscopic features can then be compared to literature references and photomicrographs for final species identification.

In order to simplify the identification process, numerous workers have organized the reference data into tables that can be manually searched for matching characteristics. Others have developed a punch card system whereby matching anatomical features are automatically separated by a simple mechanical manipulation of the cards. These methods have worked well over the years but have several minor problems. The manual search of the data tables can be confusing to the eye which may lead to errors in finding all of the possible matches. The punch card system has the problem of being tedious to reproduce.

In this paper, a Lotus 1-2-3 [1] spreadsheet search routine was developed that addresses some of the problems associated with data tables and punch cards. With this system search routines are thorough, exhaustive, and fast. The database can be easily modified, customized, and reproduced for others to use. This program searches data tables based primarily on the work of Kukachka [2] and supplemented by data from "His Majesty's Forest Products Research Bulletin" [3]. The program extracts and presents those species that meet the selected anatomical characteristics. The extracted data narrows the possibilities to just a few species that can be evaluated by other characteristics contained in the database or compared to photomicrographs included in reference texts such as Panshin and De Zeeuw [4].

SYSTEM REQUIREMENTS

This program is written on a Lotus 1-2-3 for Windows spreadsheet, Release 1.1. It requires a 25 MHz 386 computer with 4 megabytes of RAM, Microsoft Windows 3.1 operating system, and will **not** operate on Lotus compatible spreadsheets such as Excel or Quattro Pro.

RESULTS AND DISCUSSION

In order to initiate the softwood search program, up to four key characteristics must be identified by microscopic examination of thin sections of the specimen. They are as follows:

(1) ***RESIN CANALS:*** The presence or absence of longitudinal resin canals can be determined from the cross or transverse section. Additional information about resin canals is obtained by observing the transverse resin canals in the tangential section. If the epithelial cells within the ray are torn and ripped, they are considered to have thin walls. If on the other hand they have managed to remain intact after sectioning, they are considered to have thick wall epithelia. Resin canals can therefore be searched using the following three criteria: [NO], [YES], [YES(THICK WALL)].

(2) ***RAY-TRACHEIDS:*** The presence or absence of ray-tracheids can be determined from radial sections. Ray-tracheids can be distinguished from the ray parenchyma by the presence of small bordered pits in the walls of the marginal ray cells. These pits will be different than the cross field pits observed in the ray parenchyma. When the ray-tracheids exhibit tooth-like projections of the wall, they are referred to as dentate. When present, dentate ray-tracheids are obvious and often occur in multiple rows on the margins of the ray. Ray-tracheids can be searched using the following three criteria: [NO], [YES], [YES(DENTATE)].

(3) ***CROSS-FIELD PITS:*** The type of cross-field pits that are present can be determined from radial sections. Cross-field pitting is observed in the ray parenchyma cells and vary from a single large pit occupying most of the area of the cross-field to very small pits occupying a small fraction of the cross-field area. The assignment of pit type can best be accomplished by reference to drawings and photo-micrographs in Kukachka [2] and in Panshin & De Zeeuw, Figure 4-12, [4]. Cross-field pits can be searched using the following criteria: [PICEOID], [PINOID], [FENESTRIFORM], [CUPRESSOID], [TAXODIOD].

(4) ***TRACHEIDS:*** The bordered pits and spiral thickenings on the walls of longitudinal tracheids can be determined from radial sections. Tracheids with 2 to 4 bordered pits opposite each other throughout the length of the tracheid are designated [PITS 2-4 OPP]. Tracheids with 2 to 4 bordered pits in an alternate arrangement along the length of the tracheid are designated [PITS 2-4 ALT]. These are differentiated from longitudinal tracheids having a single row of bordered pits [PIT 1 ROW], as well as those with spiral thickenings [SPIRAL]. Longitudinal tracheids can be searched using the above criteria designations.

Once the key search criteria have been determined by microscopic examination, those criteria can be entered into the database search field either manually by those well versed in Lotus 1-2-3 architecture or automatically through a menu driven window. Instructions for getting started using the menu driven entry system can be accessed in the "WOOD4" spreadsheet by entering [Ctrl H]. The menu itself can be activated by entering [Ctrl M].

When all the desired search criteria have been entered, the softwood database, shown in Figure 1, can be searched for those species matching the entered criteria by pressing [Ctrl S]. The extracted data, shown in Figure 2, will appear in the output field located just below the search criteria field. It must be kept in mind that the search is only as good as the entered criteria. If an anatomical feature is misidentified during the microscopic examination, the search program will return the wrong answers. For this reason it is best to leave blank any key search criteria that are in doubt. When entering search criteria using the menu window, choosing [DON'T KNOW] will enter a blank space in the appropriate search criterion field.

SOFTWARE DISTRIBUTION

A copy of the Lotus 1-2-3 spreadsheet "WOOD4", for release 1 or for release 4, can be obtained by sending a blank formatted diskette and a self-addressed diskette-mailer to the author at:

U.S. Customs Laboratory
630 Sansome Street, Suite 1429
San Francisco, CA 94111

The software is supplied with the worksheet globally protected so that the user will not inadvertently alter the program.

ACKNOWLEGEMENTS

I would like to thank Dr. Regis Miller of the Center for Wood Anatomy Research, USDA, Madison, Wisconsin for his careful review of this manuscript, and Mr. Ron Fishman of this laboratory for many helpful suggestions.

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2. Kukachka, B.F., Tappi **43**, No.11 (1960) pp 887-896.
3. His Majesty's Forest Products Research Bulletin, No. 22, Identification of Softwoods, London, England.
4. Panshin, A.J. and De Zeeuw, C. Textbook of Wood Technology 4th edition,McGraw-Hill, 1980.

species	RESIN CANALS	RAY-TRACHEIDS	X-FIELD PITS	TRACHEIDS	transition abrupt	colored heartwood	odor	greasy	dimpled	common name
Abies amabilis	N	N	TAXODIOID	PITS 1 ROW		N	N	N	N	Pacific silver fir
Abies balsamea	N	N	TAXODIOID	PITS 1 ROW	N	N	N	N	N	Balsam fir
Abies lasiocarpa	N	N	TAXODIOID	PITS 1 ROW	N	N	Y	N	N	Alpine fir
Abies spp.	N	N	TAXODIOID	PITS 1 ROW	N	N	N	N	N	Fir
Araucaria-agathis	N	N	CUPRESSOID	PITS 2-4 ALT	N	N	N	N	N	Parana pine
Chamaecyparis noot.	N	Y	CUPRESSOID	PITS 1 ROW	N	N	Y	N	N	Alaska-cedar
Chamaecyparis law.	N	N	CUPRESSOID	PITS 1 ROW	N	N	Y	N	N	Port Orford cedar
Chamaecyparis thy.	N	N	CUPRESSOID	PITS 1 ROW	N	Y	Y	N	N	Atlantic white-cedar
Cupressus arizonica	N	N	CUPRESSOID	PITS 1 ROW	N	N	Y	N	N	Arizona cypress
Cupressus lusitanica	N	N	CUPRESSOID	PITS 1 ROW	Y	Y	N	N	N	Mexican cypress
Fitzroya cupressoides	N	N	CUPRESSOID	PITS 1 ROW	Y	Y	N	N	N	Alerce
Juniperus spp.	N	N	CUPRESSOID	PITS 1 ROW	N	Y	Y	N	N	Red cedar
Larix laricina	Y (THICK WALL)	Y	PICEOID	PITS 2-4 OPP	Y	Y	N	N	N	Tamarack
Larix occidentalis	Y (THICK WALL)	Y	PICEOID	PITS 2-4 OPP	Y	Y	N	N	N	Western larch
Libocedrus decurrens	N	N	CUPRESSOID	PITS 1 ROW	N	Y	Y	N	N	Incense cedar
Picea sitchensis	Y (THICK WALL)	Y	PICEOID	PITS 2-4 OPP	N	Y	N	N	Y	Sitka spruce
Picea spp.	Y (THICK WALL)	Y	PICEOID	PITS 1 ROW	N	N	N	N	N	Spruce
Pinus balfouriana	Y	Y	PICEOID	PITS 1 ROW	N	Y	N	N	N	Foxtail pine
Pinus banksiana*	Y	Y (DENTATE)	PINOID	PITS 1 ROW	Y	Y	Y	N	N	Jack pine
Pinus contorta*	Y	Y (DENTATE)	PINOID	PITS 1 ROW	N	Y	Y	N	Y	Lodgepole pine
Pinus echinata*	Y	Y (DENTATE)	PINOID	PITS 2-4 OPP	Y	Y	Y	N	N	Shortleaf pine
Pinus edulis	Y	Y	PICEOID	PITS 1 ROW	N	N	N	N	N	Pinyon pine
Pinus lambertiana*	Y	Y	FENESTRIFORM	PITS 1 ROW	N	Y	Y	N	N	Sugar pine
Pinus monticola l.	Y	Y	FENESTRIFORM	PITS 1 ROW	N	Y	N	N	N	Western white pine
Pinus palustris*	Y	Y (DENTATE)	PINOID	PITS 2-4 OPP	Y	Y	Y	N	N	Longleaf pine
Pinus ponderosa	Y	Y (DENTATE)	PINOID	PITS 1 ROW	Y	Y	N	Y-	Y	Ponderosa pine
Pinus radiata *	Y	Y (DENTATE)	TAXODIOID	PITS 1 ROW	Y	Y	Y	N	N	Monterey pine
Pinus resinosa	Y	Y (DENTATE)	FENESTRIFORM	PITS 1 ROW	Y	Y	N	N	N	Red pine
Pinus spp.	Y	Y (DENTATE)	PINOID	PITS 1 ROW	Y	Y	N	N	N	Pine
Pinus strobus	Y	Y	FENESTRIFORM	PITS 1 ROW	N	Y	N	N	N	Eastern white pine
Pinus taeda*	Y	Y (DENTATE)	PINOID	PITS 2-4 OPP	Y	Y	Y	N	N	Loblolly pine
Pseudotsuga	Y (THICK WALL)	Y	PICEOID	SPIRAL	Y	Y	Y	N	N	Douglas fir
Sequoia sempervirens	N	N	TAXODIOID	PITS 2-4 OPP	Y	Y	N	N	N	Coast redwood
Taxodium distichum	N	N	TAXODIOID	PITS 2-4 OPP	Y	Y	Y	Y	N	Baldcypress
Taxodium distichum	N	N	CUPRESSOID	PITS 2-4 OPP	Y	Y	Y	Y	N	Baldcypress
Taxus brevifolia	N	N	CUPRESSOID	SPIRAL	N	Y	N	N	N	Pacific yew
Thuja occidentalis	N	N	TAXODIOID	PITS 1 ROW	Y	Y	Y	N	N	Northern white-cedar
Thuja plicata	N	N	TAXODIOID	PITS 1 ROW	Y	Y	Y	N	N	Western redcedar
Torreya taxifolia	N	N	CUPRESSOID	SPIRAL	N	N	Y	N	N	Florida torreya
Tsuga canadensis	N	Y	PICEOID	PITS 2-4 OPP	Y	N	N	N	N	Canada hemlock
Tsuga heterophylla	N	Y	PICEOID	PITS 1 ROW	N	N	N	N	N	Western hemlock

* from reference # 3

Figure 1. Softwood database with key search characteristics listed in bold type.

SOFT WOOD SEARCH

press [Ctrl H] for Instructions **press [Ctrl M] to activate menu**

search criteria:	N	N	PICEOID	SPIRAL
	Y	Y	PINOID	PITS 2-4 OPP
	Y (THICK WALL)	Y (DENTATE)	FENESTRIFORM	PITS 2-4 ALT
			CUPRESSOID	PITS 1 ROW
wild card > > > > >	Y*	Y*	TAXODIOID	

Lab number: 95-22121

search criteria used > > > >	**RESIN CANALS**	**RAY-TRACHEIDS**	**X-FIELD PITS**	**TRACHEIDS**
	Y		PINOID	PITS 1 ROW

Press [Ctrl S] to extract data.

softwood species meeting the above search criteria appear below:

species	RESIN CANALS	RAY-TRACHEIDS	X-FIELD PITS	TRACHEIDS	transition abrupt	colored heartwood	odor	greasy	dimpled	common name
Pinus banksiana*	Y	Y (DENTATE)	PINOID	PITS 1 ROW	Y	Y	Y	N	N	Jack pine
Pinus contorta*	Y	Y (DENTATE)	PINOID	PITS 1 ROW	N	Y	Y	N	Y	Lodgepole pine
Pinus ponderosa	Y	Y (DENTATE)	PINOID	PITS 1 ROW	Y	Y	N	Y-	Y	Ponderosa pine
Pinus spp.	Y	Y (DENTATE)	PINOID	PITS 1 ROW	Y	Y	N	N	N	Pine

Figure 2. Softwood search output-field with search criteria located just above the output-field.

CUSTOMS
LABORATORY
BULLETIN

Volume 8 Number 1
April 1996

DETECTION OF FLUOROPOLYMERS ON WATER RESISTANT FINISHES USING THE SCANNING ELECTRON MICROSCOPE/ENERGY DISPERSIVE X-RAY

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INTRODUCTION

Water resistant garments, when imported into the United States, are classified under subheadings 6201.92.15, 6201.93.30, 6202.92.15, 6202.93.45, 6203.41.05, 6203.43.15, 6203.43.35, 6204.61.10, 6204.63.12, 6204.63.30 and 6211.20.15. They are assessed a lower duty rate than those in the same categories but which are not water resistant.

Additional U.S. Headnote 2 to Chapter 62 of the Harmonized Tariff Schedule of the United States stipulates the conditions for water resistance. The water resistant property must come from "a rubber or plastics application to the outer shell, lining, or inner lining;" (1) and in addition, the specimen must pass the rain test (AATCC Test Method 35-1989) (2). Garments treated with substances such as fluoropolymers were ruled (3) as having a plastics application for the purposes of this headnote.

The objective of this study is to use the SEM/Energy Dispersive X-Ray (4) to detect fluorine on a fluoropolymer application to textile material.

EXPERIMENTAL

1. Instrumentation

The instrument used in this investigation is an AMRAY Model 1810D Scanning Electron Microscope (AMRAY Inc., Bedford, MA) fully integrated with a Princeton Gamma-Tech IMIX IIC imaging and X-ray system equipped with an OMEGA sealed light element spectrometer (Princeton Gamma-Tech, Princeton, NJ) and operating on the IMIX version 7 software package.

The operating parameters are as follows:

Electron Gun	: 20 KV
Condenser lenses	: Spotsize 3
Aperture	: 300 u
Magnification	: 20X
Source	: LaB_6
Tilt angle	: optimized at 33^0

2. Sample preparation

An approximately 1 cm^2 specimen was cut from each sample. The specimen was mounted on an aluminum stub using Sticky Tabs (Ernest F. Fullam, Inc., Latham, NY)), a non-conductive adhesive which allows quick mounting. Each sample was scanned for 2,000 seconds. Samples were run without a sputter coating of conductive material; any resultant charging did not interfere with the X-ray fluorescence microanalysis.

RESULTS AND DISCUSSION

Seventeen samples were analyzed. The four samples used as references had been treated with 0.5%, 1.0%, 1.5% and 2.0% Scotchgard by weight of product on fabric, respectively. The remaining samples were swatches of fabric labeled water repellent, water resistant, or treated with a nonionic fluorochemical, which were pulled from various issues of JTN Monthly (a Japanese Textile Journal). The fluoropolymer treatment on these samples could not be verified.

All except three of the samples displayed a noticeable fluorine peak in their spectra, as shown in Figure 1 for the 2.0% Scotchgard treated sample. Of the three samples which did not show a fluorine peak, one had been treated with 0.5% Scotchgard, the other two were labeled as having been treated with 3.0% and 5.0% nonionic fluorochemical, respectively. All three samples were reanalyzed for 5,000 seconds each. The fluorine peak was observed with the 0.5% Scotchgard treated sample (Figure 2), but no fluorine peak was observable for the other two. One can only speculate that perhaps the latter two samples were mislabeled. Based on analysis of the 4 reference samples, the detection limits appeared to be 0.5% (by weight of fluoropolymer on fabric) for a 5,000 second scan, and 1.0% for a 2,000 second scan.

The results obtained are shown in Table 1.

Table 1. EDS Detection of Fluorine

Sample	Fluorine detection 2000 sec	5000 sec
0.5% Scotchgard treated	ND	Yes
1.0% Scotchgard treated	Yes	
1.5% Scotchgard treated	Yes	
2.0% Scotchgard treated	Yes	
100% Nylon Wpf/MP	Yes	
7.0% Nonionic fluorochemical	Yes	
Downwear, windbreaker parka	Yes	
Ultra WR	Yes	
4.0% Nonionic fluorochemical	Yes	
5.0% Nonionic fluorochemical	Yes	
100% Polyester WR	Yes	
3.0% Nonionic fluorochemical	Yes	
65/35 Polyester/Cotton WP (WR 600mm)	Yes	
55/45 Cotton/Polyester Paraffin finish	Yes	
5.0% Nonionic fluorochemical	ND	ND
3.0% Nonionic fluorochemical	ND	ND

ND = Not Detected
Wpf = Waterproof
MP = Moisture Permeable
WR = Water Repellent/Resistant

The presence of fluorine on the finish of these samples does not necessarily mean they are water resistant. The rain test could not be performed due to limited sample sizes.

In addition, X-ray microanalysis was carried out on a second set of samples which had been analyzed for water resistance by several Customs field laboratories. Some of these samples passed and some failed the rain rest. Each sample was scanned for 2,000 seconds. Figures 3 and 4 are representative X-ray spectra of this group of samples, and the analytical data obtained are presented in Table 2.

Table 2. EDS Detection of Fluorine in Samples subjected to Rain Test

	Fluorine detection
Samples passing the rain test	
10495 (front)	Yes
10683 (front)	Yes
10687 (front)	Yes
10691 (front)	Yes
10709 (back)	Yes
10710 (front)	Yes
10710 (back)	Yes
10350 (front)	Yes
Samples failing the rain test	
10207 (front)	ND
10207 (back)	ND
10282 (front)	Yes
10282 (back)	Yes
10554 (front)	ND
10554 (back)	ND
10741-A (front)	ND
10741-A (back)	ND
10741-B (front)	ND
10741-B (back)	ND
10915-A (outer shell)	ND
10915-B (inner lining)	ND

ND = Not Detected

The results in Table 2 indicate that fluorine was found either on the front or back side (or both in some cases) of all the samples which passed the rain test. It was found in only one of the samples which failed the rain test.

CONCLUSION

The data obtained in this investigation show that the SEM/ Energy Dispersive X-Ray system is able to detect fluorine in fluoropolymer application on water resistant garments.

ACKNOWLEDGMENTS

The authors are grateful to the following people for providing the samples utilized in this study:

Deborah J. Eilers, Product Development Chemist, Scotchgard Technical Services Laboratory, 3M Specialty Chemical Division, St. Paul, MN.

Judy Brockmann and Bernard Wilson, U.S. Customs Laboratory, New Orleans, LA.

Peter Pang, U.S. Customs Laboratory, Los Angeles, CA.

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2. Technical Manual of the American Association of Textile Chemists and Colorists, Volume 68, 1993.

3. U.S. Customs Headquarters ruling No. 086879 on Men's two-piece, inner and outer jacket, June 8, 1990.

4. Scanning Electron Microscopy and X-ray Microanalysis, Joseph I. Goldstein et al, Plenum Press, 1984.

Figure 1   2.0% Scotchgard treated

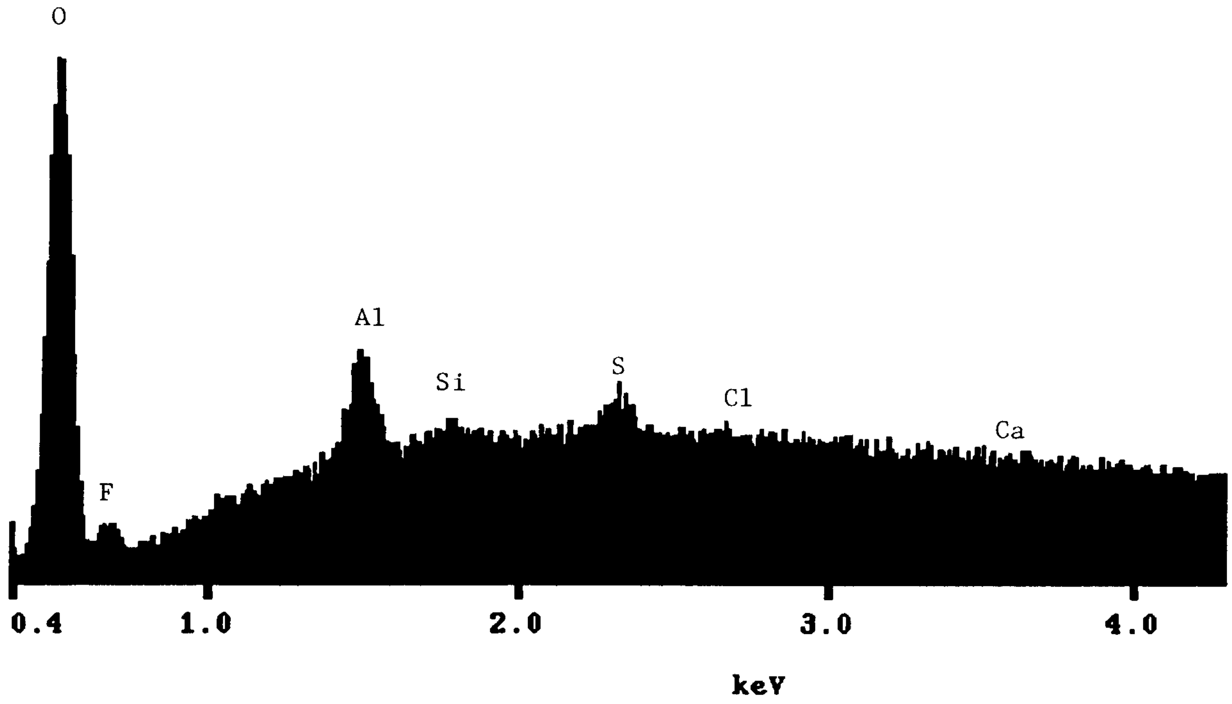


Figure 2   0.5% Scotchgard treated (5,000 second scan)

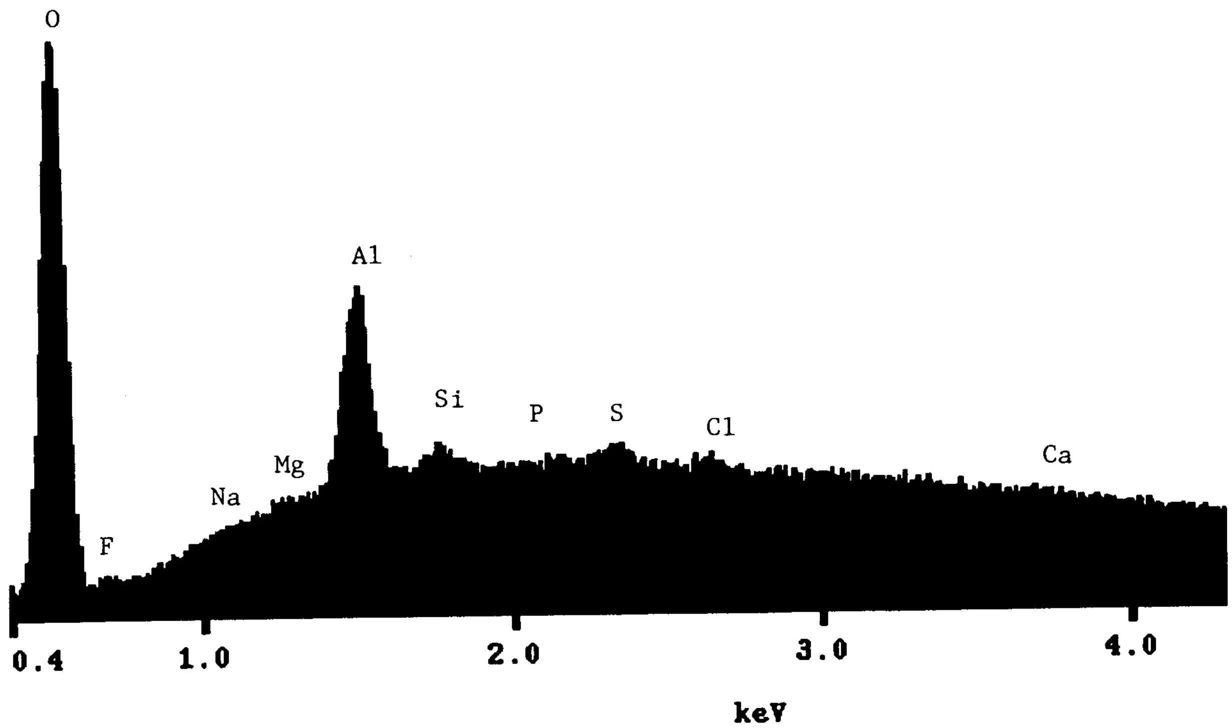


Figure 3 Passed Rain Test

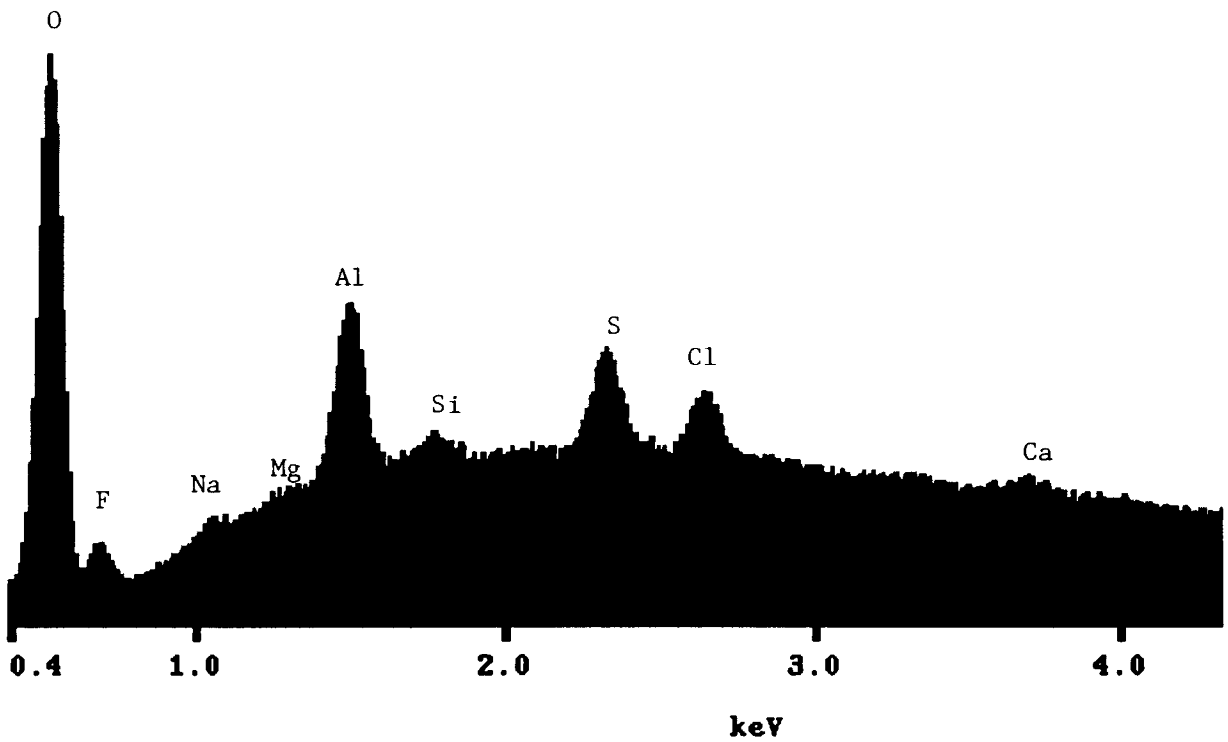
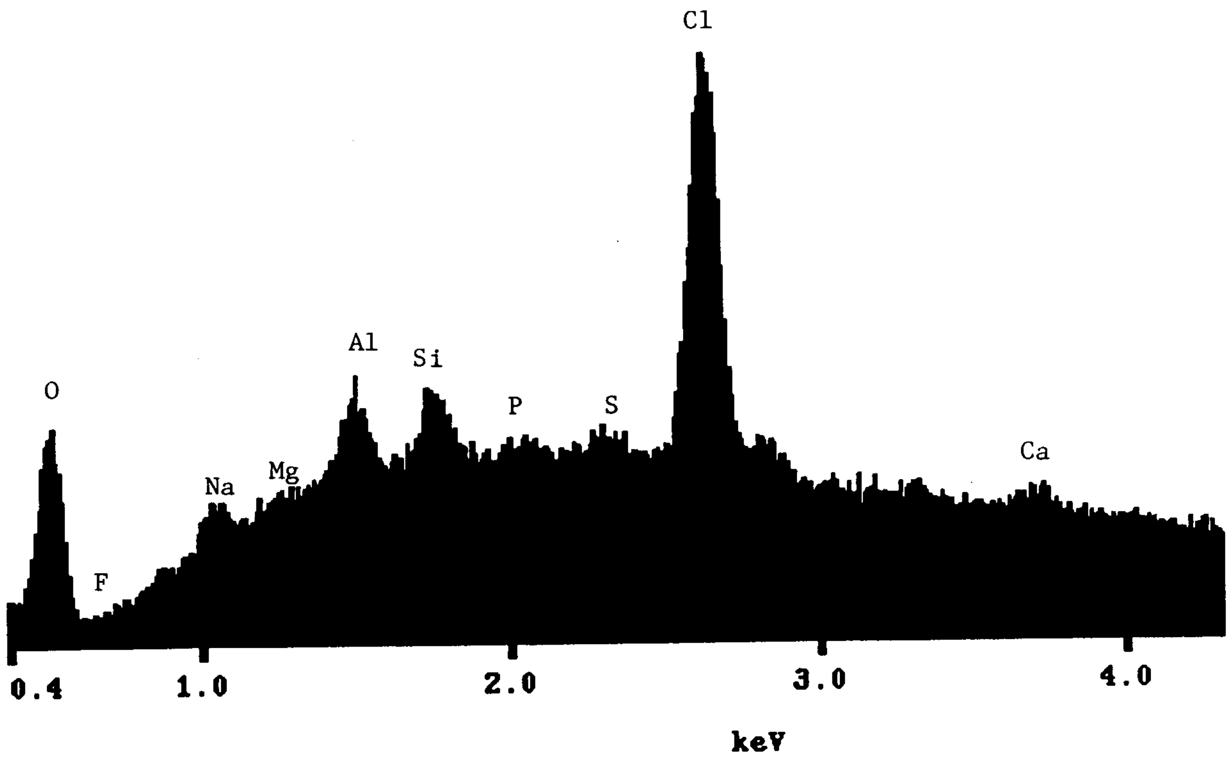


Figure 4 Failed Rain Test



CUSTOMS
LABORATORY
BULLETIN

Volume 8 Number 1
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DETECTION OF SILICON ON TEXTILE FINISHES USING THE SEM/EDS AND FTIR

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INTRODUCTION

Recently, three olive drab cotton textile garment samples were submitted to our laboratory for analysis for classification ruling under subheading 9802.00.80, for partial duty exemption. Textile articles classified under this subheading are those composed of U.S. components which are assembled abroad, and which have not been "advanced in value or improved in conditions, except by operations incidental to the assembly process such as cleaning, lubricating,.." (1). The issue was whether the "cleaning procedure" used as claimed by the importer was incidental or not.

The three garments were claimed to be laundered with an alkali detergent and a silicon compound for cleaning purposes. However, all three presented a worn out look, and a softer or silkier hand than the unwashed garments which were also submitted for comparison purposes.

According to industry experts, because of their cost the silicon materials are not added to simple cleaning operations but are used as softeners in finishing processes such as stonewashing, enzyme washing, etc. This paper discusses the approach taken by our laboratory to detect the silicon compound in order to determine whether the "cleaning" procedure is actually a finishing process.

EXPERIMENTAL

1. Instrumentation

The instruments used in the analysis of these samples are composed of the following:

- An AMRAY Model 1810D Scanning Electron Microscope (AMRAY Inc., Bedford, MA) fully integrated with a Princeton Gamma-Tech IMIX IIC imaging and X-ray system equipped with an Omega sealed light element spectrometer (Princeton Gamma-Tech, Princeton, NJ) and operating on the IMIX version 7 software package.

Operating parameters:

- Electron gun : 20 KV
- Condenser lenses : Spotsize 3
- Aperture : 300 u
- Magnification : 20X
- Source : LaB_6
- Tilt angle : Optimized at 33^0

- An FTIR spectrometer, Perkin Elmer Model 2000 (Perkin Elmer, Norwalk, CT)

2. Sample preparation

a/. For the examination on the SEM/EDS, a specimen of approximately 1 cm^2 was cut from each garment and mounted on an aluminum stub using Sticky Tabs (Ernest F. Fullam, Inc., Latham, NY), a non-conductive adhesive for quick mounting. Sputter coating of the sample was not needed for qualitative x-ray microanalysis (2).

b. For the FTIR analysis, a 2.5 cm x 5.0 cm specimen was cut from each sample and placed in a large glass test tube which was capped with a cork stopper. About 5 mL methylene chloride was used to extract the finish. The sample was allowed to stand in contact with the solvent for about an hour, with occasional stirring using a glass rod. The extract was placed a few drops at a time on a freshly prepared 13mm

KBr pellet, which was positioned on a glass microscope slide. A hot plate set at low heat was used to evaporate the solvent. This step was repeated a few times to concentrate the sample on the KBr pellet prior to obtaining the infrared spectrum.

RESULTS AND DISCUSSION

All samples were scanned on the SEM/EDS for 2,000 seconds. Figures 1 and 2 are the SEM/EDS spectra of one set of garments before and after the wash was performed, respectively.

The methylene chloride extracts were run on the FTIR at 4 cm^{-1} resolution . Figure 3 is the infrared spectrum of the methylene chloride extract from the same unwashed sample. Figure 4 is the infrared spectrum of the methylene chloride extract of the washed sample; it indicates the presence of a silicon compound which appears to have been derived from dimethylsiloxane, identified by the peaks at about 810, 1030-1100, and 1260 cm^{-1} (3,4).

Medium to strong silicon peaks also appeared in the EDS spectra of the other two washed samples. The infrared spectra of their methylene chloride extracts also indicated that they have been derived from dimethylsiloxane.

Dimethylsiloxanes are known to be used as softeners to be added to textile finishing processes to improve the feel or hand (softer and/or silkier) of the final product, or even improve the physical properties of materials impaired in strength (5). Because of the cost of the materials involved, and the change in the look (fading) and feel (hand) of the garments, it was found that these garments had been subjected to a finishing process rather than just a "cleaning" operation as claimed. As a consequence, subheading 9802.00.80 is not appropriate for these cases.

CONCLUSION

Both the SEM/EDS and FTIR were able to detect silicon in the textile finishes. These two analytical techniques complement each other - X-ray microanalysis provides a quick qualitative elemental analysis of the sample, while FTIR assists in the identification of the finishing agent.

ACKNOWLEGMENTS

The authors are grateful to the following people for providing technical advice: R. Michael Tyndall and Lee Snyder, Cotton Incorporated, Raleigh, NC.

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Figure 1 SEM/EDS Spectrum of unwashed garment.

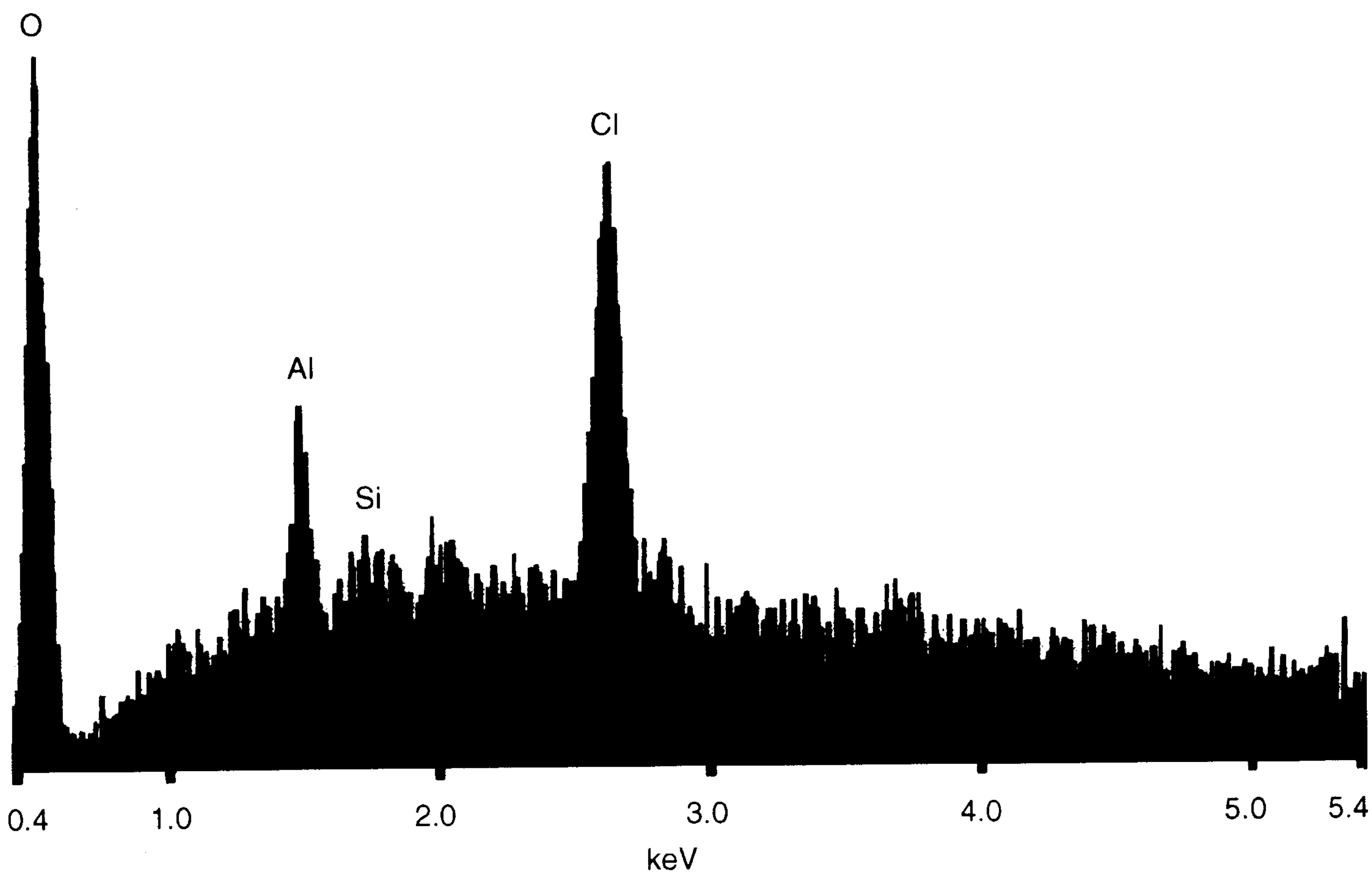


Figure 2 SEM/EDS Spectrum of washed garment

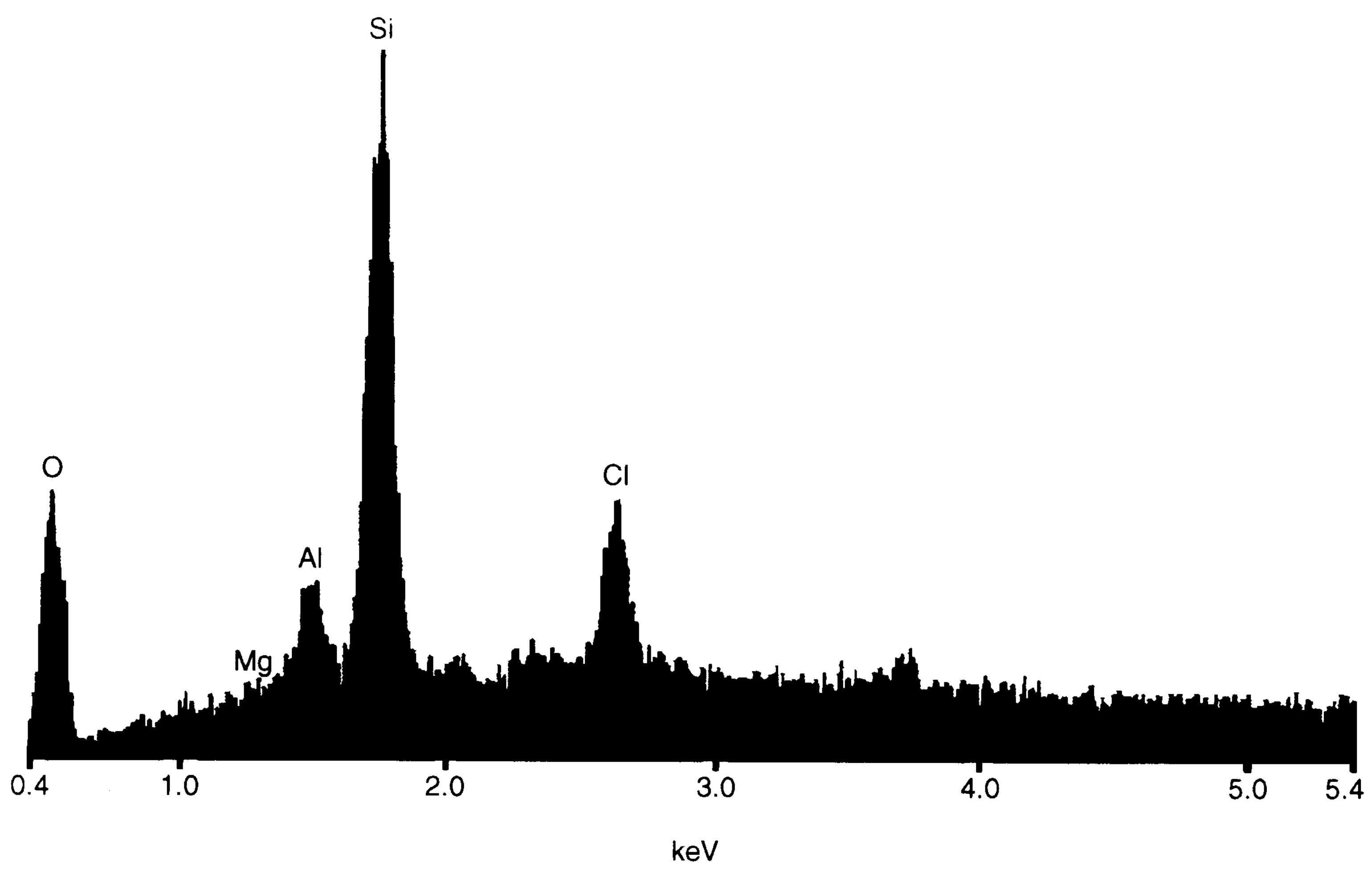


Figure 3 Methylene chloride extract of unwashed garment

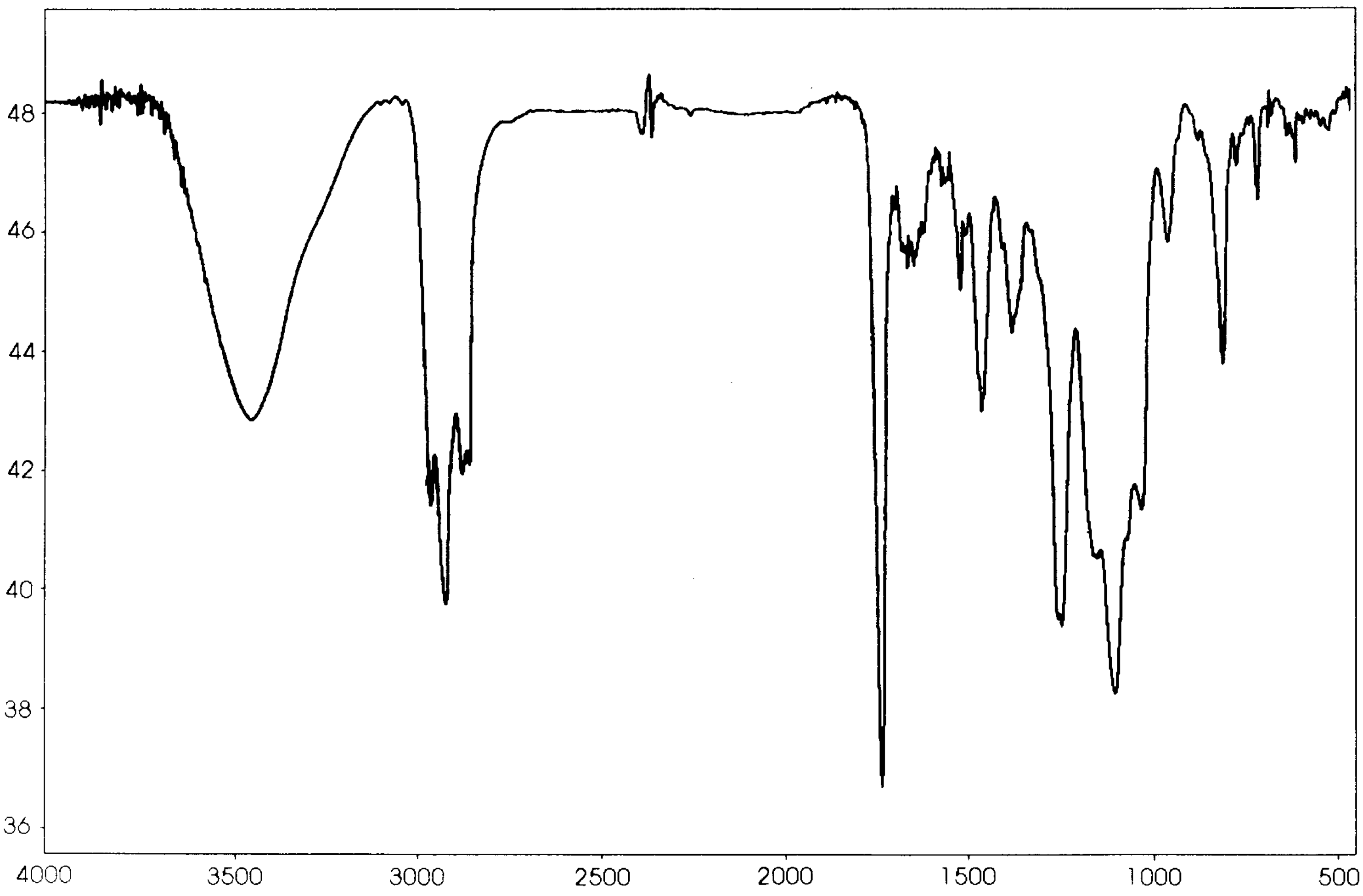
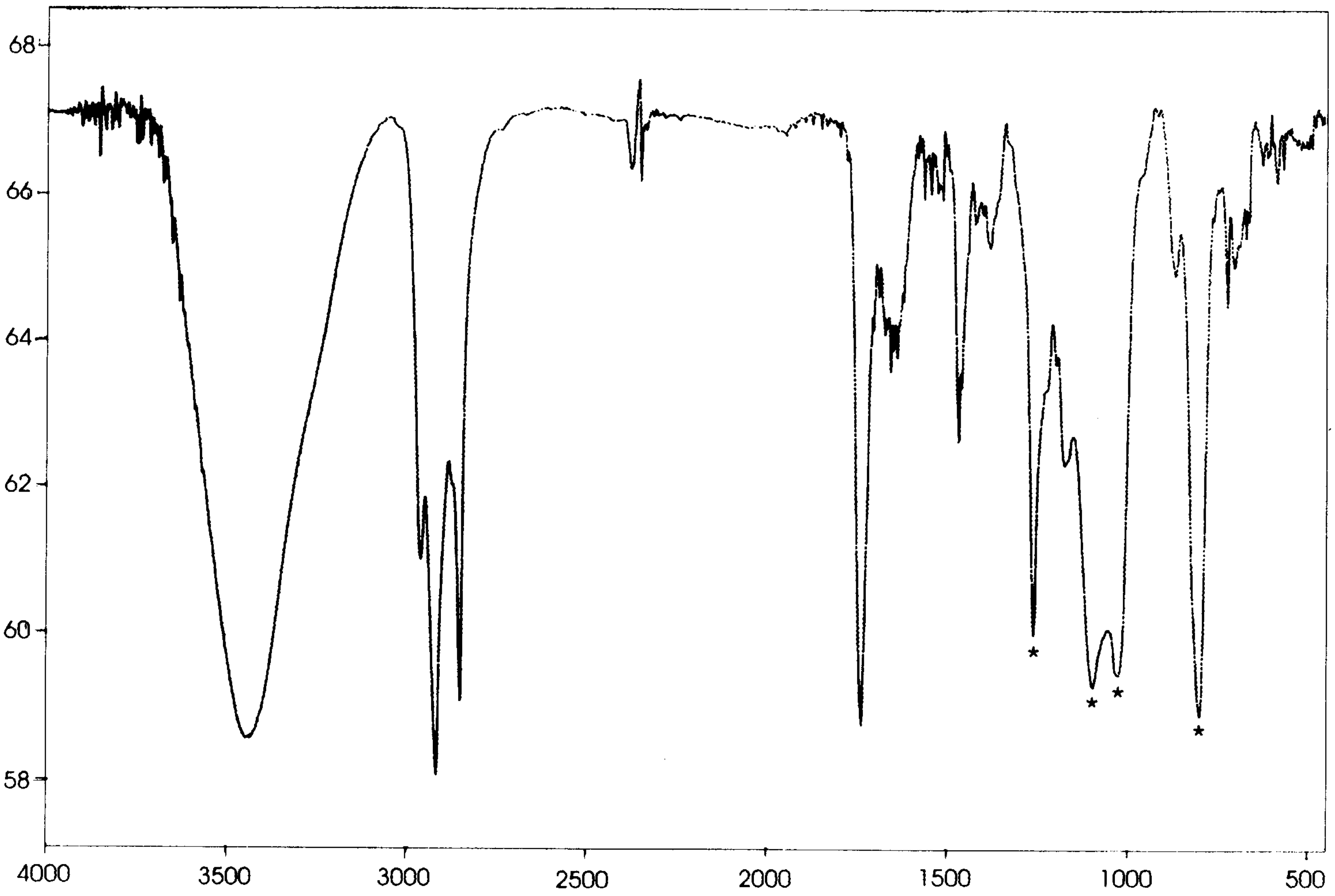


Figure 4 Methylene chloride extract of washed garment



CUSTOMS
LABORATORY
BULLETIN

Volume 8 Number 1
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INSTRUCTIONS FOR PREPARATION OF MANUSCRIPTS FOR SUBMISSION TO THE CUSTOMS LABORATORY BULLETIN

Articles for the Customs Laboratory Bulletin may be sent electronically or by regular mail. With the initial submission, please do not send original spectra or photographs; instead, send a clear photocopy of these items. After the article has been reviewed, the author will be directed to supply the camera-ready document complete with figures ready for direct reproduction. Preferably, the initial submission should be formatted using the directions that follow. A camera-ready copy prepared according to the format specifications must be received prior to formal acceptance of the article for publication.

The physical format of the manuscript should conform to the following specifications:

Page Margins (inches):	Left	1.2	Print size: 12-point
	Right	1.0	
	Top	2.0	
	Bottom	1.0	

These settings should produce a typing area for text, tables or figures of approximately 6.3 inches by 8.0 inches. The text should be single-spaced with a double space between paragraphs. Pages should be numbered in the lower right corner in light blue pencil only.

The general format of the manuscript should be as follows. The TITLE of the article should be in capital letters and centered on the first line of the typing area. There should be a double space followed by the AUTHOR'S NAME and LABORATORY, also centered on their lines. The text sections which follow are the INTRODUCTION, EXPERIMENTAL, RESULTS AND DISCUSSION, CONCLUSIONS, ACKNOWLEDGMENTS, and REFERENCES. Two lines of space above and one line of space below should separate these major section headings from the text. Each heading should be in capital letters and flush with the left margin. The following is a sample which illustrates the desired format and describes the content of each text section. The line numbers in parentheses are for illustrative purposes only.

(1) ARTICLE FOR CUSTOMS LABORATORY BULLETIN
(2)
(3) Author(s)
(4) Organization, City, State
(5)
(6)
INTRODUCTION
(8)
Explain the analytical issue or enforcement problem which prompted the effort, citing appropriate HTS classification numbers. Briefly describe the solution.
(11)
(12)
EXPERIMENTAL
(14)
Describe the procedure, samples, techniques. Describe the reagents, apparatus, instruments and conditions in tabular form, if possible. International System of Units (SI) should be used throughout.
(18)
(19)
RESULTS AND DISCUSSION
(21)
Explain the significance of the work. Refer to the Tables and Figures in this section. Tables and figures should be numbered consecutively using Arabic numerals, in the order of discussion in the text. Tables should be incorporated into the body of the text as close to the point of reference as possible; figures should be placed at the end of the text, after the REFERENCES. Additional guidance on the use of tables and figures follows this sample article.
(28)
(29)
CONCLUSIONS
(31)
Summarize results and implications of research. Discuss the relevance to other projects and further research, if any.
(34)
(35)
ACKNOWLEDGMENTS
(37)
Acknowledgment of collaboration, sources of non-commercial standards and other assistance should be mentioned here.
(40) (Last line for page, allowing for one inch bottom margin.)

REFERENCES
(2)
References in the text should be numbered consecutively and listed in this section. Avoid the use of footnotes. References should be typed single spaced with one line of space between each reference.
(6) (End of example of article format.)

Additional Information

TABLES

Tables should be incorporated into the body of the text as close to the point of reference as possible. Preferably, a table should not be split over two or more pages. If necessary, the table can be printed sideways (landscape printing) so as to fit on the page; however, margin specifications for the page still apply. The word Table followed by an Arabic numeral designator and a brief, descriptive title should be centered on the first line; following two lines of space, the table text should follow. If a single table is longer than one page or if there are more than two tables, the tables should be placed at the end of the article after the references.

FIGURES

Figures should be placed at the end of the text, after the references. They should be sized to fit within the prescribed typing area, using the margin settings listed above. Photographs should be glossy prints, preferably black and white. Drawings, graphs and spectra should be drawn in black ink on white paper. All graphs must be plotted with black ink. Spectra should be drawn or plotted on plain white paper, since background grids do not reproduce well in the printing process. Captions for the figures should be typed single spaced centered on the typing line, preceded by the word Figure with an Arabic numeral designator. There should be sufficient information in the caption and legends to explain the figure. More than one figure can be put on a page, arranged in sequential order, provided that they fit within the overall page margins.

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