

Carbaryl; CASRN 63-25-2

Human health assessment information on a chemical substance is included in the IRIS database only after a comprehensive review of toxicity data, as outlined in the [IRIS assessment development process](#). Sections I (Health Hazard Assessments for Noncarcinogenic Effects) and II (Carcinogenicity Assessment for Lifetime Exposure) present the conclusions that were reached during the assessment development process. Supporting information and explanations of the methods used to derive the values given in IRIS are provided in the [guidance documents located on the IRIS website](#).

STATUS OF DATA FOR Carbaryl

File First On-Line 01/31/1987

Category (section)	Assessment Available?	Last Revised
Oral RfD (I.A.)	yes	01/31/1987
Inhalation RfC (I.B.)	message	11/01/1991
Carcinogenicity Assessment (II.)	not evaluated	

I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

I.A. Reference Dose for Chronic Oral Exposure (RfD)

Substance Name — Carbaryl
CASRN — 63-25-2
Last Revised — 01/31/1987

The oral Reference Dose (RfD) is based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis. It is expressed in units of mg/kg-day. In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Please refer to the Background Document for an elaboration of these concepts. RfDs can also be derived for the noncarcinogenic health effects of

substances that are also carcinogens. Therefore, it is essential to refer to other sources of information concerning the carcinogenicity of this substance. If the U.S. EPA has evaluated this substance for potential human carcinogenicity, a summary of that evaluation will be contained in Section II of this file.

I.A.1. Oral RfD Summary

Critical Effect	Experimental Doses*	UF	MF	RfD
Kidney and liver toxicity	NOAEL: 200 ppm of diet (9.6 mg/kg/day)	100	1	1E-1 mg/kg/day
Rat Chronic Feeding Study	LOAEL: 400 ppm of diet 15.6 mg/kg/day			
Carpenter et.al, 1961				

*Conversion Factors -- Dose conversion based on body weight and food consumption data reported by the authors.

I.A.2. Principal and Supporting Studies (Oral RfD)

Carpenter, C.P., C.W. Weil, P.E. Polin, et al. 1961. Mammalian toxicity of 1-naphthayl-N-methylcarbamate (Sevin insecticide). J. Agric. Food Chem. 9: 30-39.

Groups of 20 CF-N rats/sex were fed carbaryl at 0, 50, 100, 200, or 400 ppm of diet for 2 years. Food consumption and body weight records were maintained. Interim sacrifices (4-8 animals) from concurrent auxiliary groups were performed at 6, 9, and 12 months for organ weight comparisons and histopathologic analysis. Hematologic analyses were done at irregular intervals throughout the study. Surviving animals were sacrificed at 2 years with gross and histopathologic examinations performed. The only noteworthy effects reported were slight histopathologic changes in the kidneys and liver at the high-dose level. Diffuse cloudy swelling of renal tubules was observed at 1 and 2 years. A statistically significant increase in cloudy swelling of the hepatic cords was also observed after 2 years. Based on body weight and food consumption data, the LOAEL of 400 ppm was equivalent to a dose of 15.6 mg/kg bw/day. The NOAEL established was 9.6 mg/kg bw/day.

I.A.3. Uncertainty and Modifying Factors (Oral RfD)

UF — UF = 10a x 10h. The UF of 100 includes uncertainties in interspecies and intrahuman variability.

MF — None

I.A.4. Additional Studies/Comments (Oral RfD)

Effect and no-effect levels (14 and 7 mg/kg/day, respectively) similar to those found in the critical study were observed for rat body weight reduction and cholinesterase inhibition in a 1-year study. In subchronic rat studies, higher dose levels (85-200 mg/kg/day) caused kidney toxicity and biochemical changes. Kidney lesions were observed in dogs fed carbaryl at 5 mg/kg/day for 1 year; however, the effect was not clearly associated with treatment, since the lesions appeared in control animals but not in lower dose groups.

Carbaryl was teratogenic for several species, with widely varying NOELs. The lowest effect levels of 5-6 mg/kg were observed for dogs, with NOELs of 2-3 mg/kg. Other LOELs were higher than the established chronic LOAEL of 15.6 mg/kg/day. Carbaryl was not teratogenic for monkeys at 20 mg/kg. The dog studies were judged inappropriate for human health risk assessment because of differences in the metabolism of carbaryl between dogs and humans.

I.A.5. Confidence in the Oral RfD

Study — High

Database — Medium

RfD — Medium

The principal study was well designed and clearly reported with unequivocal effect levels established. The database is moderately supportive of the nature of the critical effect, if somewhat sparse. The principal problem is the observation of teratogenicity in dogs at lower doses. Because the significance of these data cannot be discounted entirely, confidence in the RfD should be considered medium to low.

I.A.6. EPA Documentation and Review of the Oral RfD

Source Document — U.S. EPA, 1984

Limited Agency Review of 1984 Health and Environmental Effects Profile with the help of two external scientists.

Other EPA Documentation — None

Agency Work Group Review — 05/31/1985

Verification Date — 05/31/1985

Screening-Level Literature Review Findings — A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the RfD for Carbaryl conducted in September 2002 identified one or more significant new studies. IRIS users may request the references for those studies from the IRIS Hotline at hotline.iris@epa.gov or (202)566-1676.

I.A.7. EPA Contacts (Oral RfD)

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

Substance Name — Carbaryl
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The health effects data for carbaryl were reviewed by the U.S. EPA RfD/RfC Work Group and determined to be inadequate for derivation of an inhalation RfC. For additional information on the health effects of this chemical, interested parties are referred to the EPA documentation listed below.

U.S. EPA. 1984. Health and Environmental Effects Profile for Carbaryl. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste, Washington, DC. EPA/600/X-84/155.

Agency Work Group Review — 08/15/1991

Screening-Level Literature Review Findings — A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the RfC for Carbaryl conducted in September 2002 did not identify any critical new studies. IRIS users who know of important new studies may provide that information to the IRIS Hotline at hotline.iris@epa.gov or (202)566-1676.

EPA Contacts:

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name — Carbaryl
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This substance/agent has not undergone a complete evaluation and determination under US EPA's IRIS program for evidence of human carcinogenic potential.

III. [reserved]

IV. [reserved]

V. [reserved]

VI. Bibliography

Substance Name — Carbaryl
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VI.A. Oral RfD References

Carpenter, C.P., C.W. Weil, P.E. Polin, et al. 1961. Mammalian toxicity of 1-naphthayl-N-methylcarbamate (Sevin insecticide). J. Agric. Food Chem. 9: 30-39.

U.S. EPA. 1984. Health and Environmental Effects Profile for Carbaryl. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office Cincinnati, OH for the Office of Solid Waste, Washington, DC.

VI.B. Inhalation RfC References

U.S. EPA. 1984. Health and Environmental Effects Profile for Carbaryl. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste, Washington, DC. EPA/600/X-84/155.

VI.C. Carcinogenicity Assessment References

None

VII. Revision History

Substance Name — Carbaryl
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Date	Section	Description
11/01/1991	I.B.	Inhalation RfC message on-line
12/03/2002	I.A.6., I.B.	Screening-Level Literature Review Findings message has been added.

VIII. Synonyms

Substance Name — Carbaryl
CASRN — 63-25-2
Last Revised — 01/31/1987

- 63-25-2
- ARYLAM
- CARBAMINE
- CARBARIL
- Carbaryl

- CARBATOX
- CARBATOX-60
- CARBATOX 75
- CARPOLIN
- CARYLDERM
- CEKUBARYL
- CRAG SEVIN
- DENAPON
- DEVICARB
- ENT 23,969
- GAMONIL
- GERMAIN'S
- HEXAVIN
- KARBARYL
- KARBASPRAY
- KARBATOX
- KARBOSEP
- METHYLCARBAMATE 1-NAPHTHALENOL
- METHYLCARBAMATE 1-NAPHTHOL
- METHYLCARBAMIC ACID
- NA 2757
- NAC
- alpha-NAFTYL-N-METHYLKARBAMAT
- 1-NAPHTHOL N-METHYLCARBAMATE
- 1-NAPHTHYL ESTER
- 1-NAPHTHYL METHYLCARBAMATE
- 1-NAPHTHYL N-METHYLCARBAMATE
- alpha-NAPHTHYL N-METHYLCARBAMATE
- 1-NAPHTHYL-N-METHYL-KARBAMAT
- N-METHYLCARBAMATE DE 1-NAPHTYLE
- N-METHYL-1-NAFTYL-CARBAMAAT
- N-METHYL-1-NAPHTHYL-CARBAMAT
- N-METHYL-1-NAPHTHYL CARBAMATE
- N-METHYL-alpha-NAPHTHYLCARBAMATE
- N-METHYL-alpha-NAPHTHYLURETHAN
- N-METIL-1-NAFTIL-CARBAMMATO
- OMS-29
- PANAM
- RYLAM
- SEFFEIN
- SEPTENE
- SEVIMOL
- SEVIN
- SOK
- TERCYL

- TOXAN
- TRICARNAM
- UC 7744
- UNION CARBIDE 7,744