

Carbofuran; CASRN 1563-66-2

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 Carbofuran

File First On-Line 09/30/1987

Category (section)	Assessment Available?	Last Revised
Oral RfD (I.A.)	yes	09/30/1987
Inhalation RfC (I.B.)	not evaluated	
Carcinogenicity Assessment (II.)	not evaluated	

I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

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

Substance Name — Carbofuran

CASRN — 1563-66-2

Last Revised — 09/30/1987

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
RBC and plasma cholinesterase inhibition, and testicular and uterine effects	NOEL: 0.5 mg/kg/day LEL: 12.5 mg/kg/day	100	1	5E-3 mg/kg/day
One-Year Dog Feeding Study				
FMC Corp., 1983				

*Conversion Factors: none

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

FMC Corporation. 1983. MRID No. 00129507. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Six beagle dogs of each sex were fed 0, 0.25, 0.50, and 12.5 mg/kg/day carbofuran for 1 year. The following results were noted: 1) decreased plasma and RBC AChE depression throughout the year in both sexes at 12.5 mg/kg/day; 2) no change in food consumption and body weight; 3) changes in clinical chemistry (decreases in protein, calcium, and sodium levels, and lowered hematocrit, hemoglobin, and RBC at 12.5 mg/kg/day); 4) histopathology showed testicular seminiferous tubule degeneration, giant cell formation, and aspermia at 12.5 mg/kg/day; and 5) uterine hyperplasia and hydrometra at 12.5 mg/kg/day.

An RfD of 5E-3 mg/kg/day (UF=10) can also be derived from human data that indicate a possible NOEL of 0.05 mg/kg/day for cholinesterase inhibition. This study was not chosen as the principal study because of severe deficiencies, short duration, and inappropriate route of

exposure. However, the human data suggest that the RfD based on the dog study is in the right range.

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

UF — An uncertainty factor of 100 was used to account for the inter- and intraspecies differences.

MF — None

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

Data Considered for Establishing the RfD:

- 1) 1-Year Feeding - dog: Principal study - see previous description; core grade minimum
- 2) 2-Year Feeding (oncogenic) - rat: Systemic NOEL=1 mg/kg/day; Systemic LEL=5 mg/kg/day; core grade minimum (FMC Corp., 1979a)
- 3) 3-Generation Reproduction - rat: NOEL=1.0 mg/kg/day; LEL=5 mg/kg/day; core grade minimum (FMC Corp., 1979b)
- 4) Teratology - rat: Fetotoxic NOEL=1.0 mg/kg/day; Fetotoxic LEL=3 mg/kg/day (reduced body weight); core grade minimum (FMC Corp., 1981a)
- 5) Teratology - rabbit: Fetotoxic NOEL=2.0 mg/kg/day (HDT); Fetotoxic LEL=none; core grade minimum (FMC Corp., 1981b)

Other Data Reviewed:

- 1) 2-Year Feeding (oncogenic) - mice: Systemic NOEL=18.75 mg/kg/day; ChE NOEL=3 mg/kg/day; core grade guideline (FMC Corp., 1980)
- 2) Acute Oral - human: Approximate NOEL=0.05 mg/kg/day (ChE inhibition); core grade supplementary; insufficient study (FMC Corp., 1976)

Data Gap(s): None

I.A.5. Confidence in the Oral RfD

Study — High
Database — High
RfD — High

The principal study appears to be of good quality and is given a high confidence rating. The supporting database is also of high quality and, therefore, is given a high confidence rating. High confidence in the RfD follows.

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

Pesticide Registration Files

Agency Work Group Review — 03/11/86, 03/18/1987

Verification Date — 03/18/1987

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 Carbofuran 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.

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 — Carbofuran
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Not available at this time.

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name — Carbofuran
CASRN — 1563-66-2

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 — Carbofuran
CASRN — 1563-66-2

VI.A. Oral RfD References

FMC Corporation. 1976. MRID No. 00092826. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

FMC Corporation. 1979a. MRID No. 00030498. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

FMC Corporation. 1979b. MRID No. 00030514, 00030570, 00043747. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

FMC Corporation. 1980. MRID No. 00030512, 00043745. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

FMC Corporation. 1981a. MRID No. 00058611. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

FMC Corporation. 1981b. MRID No. 00076762. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

FMC Corporation. 1983. MRID No. 00129507. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

VI.B. Inhalation RfD References

None

VI.C. Carcinogenicity Assessment References

None

VII. Revision History

Substance Name — Carbofuran
CASRN — 1563-66-2

Date	Section	Description
12/03/2002	I.A.6.	Screening-Level Literature Review Findings message has been added.

VIII. Synonyms

Substance Name — Carbofuran
CASRN — 1563-66-2
Last Revised — 09/30/1987

- 1563-66-2
- BAY 70143
- CARBAMIC ACID, METHYL-, 2,3-DIHYDRO-2,2-DIMETHYL-7-BENZOFURANYL ESTER

- CARBAMIC ACID, METHYL-, 2,2-DIMETHYL-2,3-DIHYDROBENZOFURAN-7-YL ESTER
- Carbofuran
- CURATERR
- D 1221
- 2,3-DIHYDRO-2,2-DIMETHYLBENZOFURAN-7-YL METHYLCARBAMATE
- 2,3-DIHYDRO-2,2-DIMETHYLBENZOFURANYL-7-N-METHYLCARBAMATE
- 2,2-DIMETHYL-7-COUMARANYL N-METHYLCARBAMATE
- 2,2-DIMETHYL-2,3-DIHYDRO-7-BENZOFURANYL N-METHYLCARBAMATE
- ENT 27,164
- FMC 10242
- FURADAN
- FURODAN
- KARBOFURANU
- METHYL CARBAMIC ACID 2,3-DIHYDRO-2,2-DIMETHYL-7-BENZOFURANYL ESTER
- NA 2757
- NIA 10242
- NIAGARA 10242
- NIAGARA NIA-10242
- YALTOX