

## Parathion; CASRN 56-38-2

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 Parathion

**File First On-Line 08/22/1988**

Category (section)	Assessment Available?	Last Revised
Oral RfD (I.A.)	not evaluated	
Inhalation RfC (I.B.)	not evaluated	
Carcinogenicity Assessment (II.)	yes	08/22/1988

## I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

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

Substance Name — Parathion

CASRN — 56-38-2

Not available at this time.

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

Substance Name — Parathion  
CASRN — 56-38-2

Not available at this time.

---

## **II. Carcinogenicity Assessment for Lifetime Exposure**

Substance Name — Parathion  
CASRN — 56-38-2  
Last Revised — 08/22/1988

Section II provides information on three aspects of the carcinogenic assessment for the substance in question; the weight-of-evidence judgment of the likelihood that the substance is a human carcinogen, and quantitative estimates of risk from oral exposure and from inhalation exposure. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. The rationale and methods used to develop the carcinogenicity information in IRIS are described in The Risk Assessment Guidelines of 1986 (EPA/600/8-87/045) and in the IRIS Background Document. IRIS summaries developed since the publication of EPA's more recent Proposed Guidelines for Carcinogen Risk Assessment also utilize those Guidelines where indicated (Federal Register 61(79):17960-18011, April 23, 1996). Users are referred to Section I of this IRIS file for information on long-term toxic effects other than carcinogenicity.

### **II.A. Evidence for Human Carcinogenicity**

#### **II.A.1. Weight-of-Evidence Characterization**

Classification — C; possible human carcinogen.

Basis — Increased adrenal cortical tumors in female and male Osborne-Mendel rats and positive trends for thyroid follicular adenomas and pancreatic islet-cell carcinomas in male rats in one study.

## **II.A.2. Human Carcinogenicity Data**

None

## **II.A.3. Animal Carcinogenicity Data**

Limited. Osborne-Mendel rats, 50/sex/group were exposed to dietary levels of parathion; 10/sex served as controls. Due to toxicity, the original doses for males (40 and 80 ppm) and females (20 and 40 ppm) were changed at 13 weeks to 30 and 60 ppm for both males and females. The female doses were returned to 20 and 40 ppm at week 46. Depressed body weight gain was observed while animals were on the test diets and demonstrated that the MTD was reached. Mortality was not affected. Adrenal cortical adenomas and combined adrenal adenomas and carcinomas were significantly increased in both sexes at the high dose and in the males at the low dose. Additionally, there were significant positive trends with respect to pooled controls for thyroid follicular adenomas and pancreatic islet cell carcinomas in the males. This study has the following limitations: the control group only contained 10 rats/sex; some tissues were not examined microscopically; some rats were only dosed for 80 weeks of the 112-week study; and lab audit of the study indicated instances of nonadherence to good laboratory practices by the test facility. Despite these limitations, the study was accepted, as a definitive tumor response at one site and marginal responses at two sites had been produced (NCI, 1979).

B6C3F1 mice (50/sex/dose, 10/sex for controls) were exposed to parathion (99.5% purity) in the diet at 0, 80, or 160 ppm for 62 to 80 weeks. No oncogenic effects were noted in either sex at either dose. Based on the data reported, the maximum tolerated dose (MTD) was reached in the male mice but was probably not achieved in the females. The study was flawed for reasons similar to those outlined for the NCI rat study (NCI, 1979).

In a well-conducted study, 60 male and 60 female Sprague-Dawley rats/sex/dose group were maintained on diets containing 0, 0.5, 5.0, and 50.0 ppm parathion for 110 (males) and 120 (females) weeks. The mortality in the 5-ppm males was increased between months 7 and 23, but mortality in all groups was comparable to controls at termination. The MTD was slightly exceeded at the high dose in this study, but no compound-induced oncogenic response was observed (Biodynamics, 1984).

## **II.A.4. Supporting Data for Carcinogenicity**

A positive response was found with and without metabolic activation at 10E-5 and 10E-6 molar concentrations in an unscheduled DNA synthesis assay using human WI-38 cells (U.S. EPA, 1986). Other mutagenicity assays were negative (reverse mutation in bacteria, mitotic

recombination in yeast, and DNA repair in bacteria) but these tests were considered inadequate by the Office of Pesticide Programs Peer Review Panel.

---

## **II.B. Quantitative Estimate of Carcinogenic Risk from Oral Exposure**

Not available

---

## **II.C. Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure**

Not available.

---

## **II.D. EPA Documentation, Review, and Contacts (Carcinogenicity Assessment)**

### **II.D.1. EPA Documentation**

Source Document — U.S. EPA, 1986

The Toxicology Branch Peer Review Committee, Office of Pesticide Programs, Office of Pesticides and Toxic Substances reviewed data on parathion.

### **II.D.2. EPA Review (Carcinogenicity Assessment)**

Agency Work Group Review — 08/05/1987

Verification Date — 08/05/1987

Screening-Level Literature Review Findings — A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the cancer assessment for parathion conducted in August 2003 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](mailto:hotline.iris@epa.gov) or 202-566-1676.

### **II.D.3. EPA Contacts (Carcinogenicity Assessment)**

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](mailto:hotline.iris@epa.gov) (internet address).

**III. [reserved]**

**IV. [reserved]**

**V. [reserved]**

---

## **VI. Bibliography**

Substance Name — Parathion  
CASRN — 56-38-2

### **VI.A. Oral RfD References**

None

---

### **VI.B. Inhalation RfD References**

None

---

### **VI.C. Carcinogenicity Assessment References**

Biodynamics, Inc. 1984. MRID No. 00165344. Available from EPA. Write to FOI, EPA, Washington DC 20460.

NCI (National Cancer Institute). 1979. Bioassay of parathion for possible carcinogenicity. NCI-CG-TR-70. DHEW (NIH) 79-1320.

U.S. EPA. 1986. Toxicology Branch Peer Review Committee, Office of Pesticide Programs, Office of Pesticides and Toxic Substances, memorandum on parathion, July 1.

---

## VII. Revision History

Substance Name — Parathion  
CASRN — 56-38-2

Date	Section	Description
08/22/1988	II.	Carcinogen summary on-line
10/28/2003	II.D.2	Screening-Level Literature Review Findings message has been added.

## VIII. Synonyms

Substance Name — Parathion  
CASRN — 56-38-2  
Last Revised — 01/01/1990

- 56-38-2
- AAT
- AATP
- AC 3422
- ACC 3422
- AI3-15108
- ALKRON
- ALLERON
- AMERICAN CYANAMID 3422
- APHAMITE
- ARALO
- B 404
- BAY E-605
- BAYER E-605
- BLADAN
- BLADAN F
- CASWELL NO. 637
- COMPOUND 3422

- COROTHION
- CORTHION
- CORTHIONE
- DANTHION
- DIETHYL PARA-NITROPHENOL THIOPHOSPHATE
- DIETHYL-P-NITROPHENYL MONOTHIOPHOSPHATE
- O,O-DIETHYL O-(P-NITROPHENYL) PHOSPHOROTHIOATE
- DIETHYL 4-NITROPHENYL PHOSPHOROTHIONATE
- DIETHYL P-NITROPHENYL PHOSPHOROTHIONATE
- DIETHYL P-NITROPHENYL THIONOPHOSPHATE
- O,O-DIETHYL O-P-NITROPHENYL THIOPHOSPHATE
- DIETHYL P-NITROPHENYL THIOPHOSPHATE
- DIETHYL PARATHION
- DIETHYL PARATHION
- DIETIL TIOFOSFATO DE P-NITROFENILA [PORTUGUESE]
- DNTP
- DPP
- DREXEL PARATHION 8E
- E 605
- E 605 F
- E 605 FORTE
- ECATOX
- EKATIN WF WF ULV
- EKATOX
- ENT 15,108
- EPA PESTICIDE CHEMICAL CODE 057501
- ETHLON
- ETHYL PARATHION
- ETILON
- ETYLPARATION [CZECH]
- FOLIDOL
- FOLIDOL E
- FOLIDOL E605
- FOLIDOL E E 605
- FOLIDOL OIL
- FOSFERNO
- FOSFEX
- FOSFIVE
- FOSOVA
- FOSTERN
- FOSTOX
- GEARPHOS
- GENITHION
- HSDB 197
- KOLPHOS

- KYPHION
- LETHALAIRE G-54
- LIROTHION
- MURFOS
- NA 2783
- NCI-C00226
- NIRAN
- NIRAN E-4
- NITROSTIGMIN (GERMAN)
- NITROSTIGMINE
- NITROSTYGMINE
- NIUIF 100
- NOURITHION
- OLEOFOS 20
- OLEOPARAPHENE
- OLEOPARATHION
- OMS 19
- O,O-DIAETHYL-O-(4-NITRO-PHENYL)-MONOTHIOPHOSPHAT [GERMAN]
- O,O-DIETHYL-O,P-NITROPHENYL PHOSPHOROTHIOATE
- O,O-DIETHYL-O-(4-NITRO-FENIL)-MONOTHIOFOSFAAT [DUTCH]
- O,O-DIETHYL-O-P-NITROFENYLESTER KYSELINY THIOFOSFORECNE [CZECH]
- O,O-DIETHYL O-4-NITROPHENYL PHOSPHOROTHIOATE
- O,O-DIETHYL-O-(4-NITROPHENYL) PHOSPHOROTHIOATE
- O,O-DIETHYL O-(4-NITROPHENYL) PHOSPHOROTHIOATE (9CI)
- O,O-DIETHYL O-P-NITROPHENYLPHOSPHOROTHIOATE
- O,O-DIETHYL-O-(P-NITROPHENYL)THIONOPHOSPHATE
- O,O-DIETHYL O-4-NITROPHENYL THIOPHOSPHATE
- O,O-DIETHYL O-P-NITROPHENYL THIOPHOSPHATE
- O,O-DIETHYL O-(P-NITROPHENYL) PHOSPHOROTHIOATE
- O,O-DIETIL-O-(4-NITRO-FENIL)-MONOTIOFOSFATO [ITALIAN]
- O,O-DIETYL-O-P-NITROFENYLTIOFOSFAT [CZECH]
- ORTHOPHOS
- PAC
- PACOL
- PANTHION
- PARADUST
- PARAFLOW
- PARAMAR
- PARAMAR 50
- PARAPHOS
- PARASPRAY
- PARATHENE
- PARATHION
- PARATHION-ACETYL [GERMAN]



- PARATHION-AETHYL [GERMAN]
- PARATHION-ETHYL
- PARATHION, LIQUID
- PARATHION MIXTURE, DRY
- PARATHION MIXTURE, LIQUID
- PARAWET
- PENNCAP E
- PENPHOS
- PESTOX PLUS
- PETHION
- PHENOL, P-NITRO-, O-ESTER WITH O,O-DIETHYLPHOSPHOROTHIOATE
- PHOSKIL
- PHOSPHENOL
- PHOSPHOROTHIOIC ACID, O,O-DIETHYL O-(4-NITROPHENYL) ESTER
- PHOSPHOROTHIOIC ACID, O,O-DIETHYL O-(P-NITROPHENYL) ESTER
- PHOSPHOSTIGMINE
- RB
- RCRA WASTE NUMBER P089
- RHODIASOL
- RHODIATOX
- RHODIATROX
- SELEPHOS
- SIXTY-THREE SPECIAL E.C. INSECTICIDE
- SNP
- SOPRATHION
- STABILIZED ETHYL PARATHION
- STATHION
- STRATHION
- SULPHOS
- SUPER RODIATOX
- T-47
- THIOFOS
- THIOMEX
- THIOPHOS
- THIOPHOS 3422
- THIOPHOSPHATE DE O,O-DIETHYLE ET DE O-(4-NITROPHENYLE) [FRENCH]
- TIOFOS
- TOX 47
- VAPOPHOR
- VAPOPHOS
- VITREX