

## Merphos; CASRN 150-50-5

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 Merphos

**File First On-Line 09/07/1988**

Category (section)	Assessment Available?	Last Revised
<b>Oral RfD (I.A.)</b>	yes	09/07/1988
<b>Inhalation RfC (I.B.)</b>	message	11/01/1992
<b>Carcinogenicity Assessment (II.)</b>	not evaluated	

## I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

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

Substance Name — Merphos  
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Last Revised — 09/07/1988

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
<b>Ataxia, delayed neurotoxicity and weight loss</b>	NOEL: 0.1 mg/kg/day LOAEL: 0.5 mg/kg/day	3000	1	3E-5 mg/kg/day
<b>90-Day Hen Delayed Neurotoxicity Study</b>				
<b>Abou-Donia et al., 1980</b>				

\* Conversion Factors: None

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

Abou-Donia, M.B., D.G. Graham, P.R. Timmons and B.L. Reichert. 1980. Late acute, delayed neurotoxic and cholinergic effects of S,S,S- tributylphosphorotrithioite (merphos) in hens. *Toxicol. Appl. Pharmacol.* 53: 439-457.

Groups of mixed breed hens (5/group) were given a daily oral dose of 0.1, 0.5, 1.0, 2.5, 5.0, 10, 20, 40, or 80 mg/kg of merphos in gelatin capsules for 3 months. Hens at the highest two doses were given 10 to 30 mg/kg/day atropine sulfate (4 to 7 days) as protection against cholinergic effects. Controls consisted of four groups of five hens treated orally with either empty gelatin capsules; 10 mg/kg/day tri-o-cresyl phosphate (positive control); or 1 mg/kg/day parathion (negative control) for 3 months. Another group of three hens was given a daily oral dose of 30 mg/kg of atropine sulfate for 34 to 90 days as an atropine sulfate control. At the end of the treatment period, the birds were observed for 1 month then sacrificed and tissues from the central and peripheral nervous systems were taken for histological examination. Hens receiving 20-80 mg/kg/day lost weight and developed severe ataxia and delayed neurotoxicity that progressed to paralysis. Mortality also occurred at these dose levels. Hens receiving doses of 0.5-10 mg/kg/day lost weight, but regained it by the end of the observation period. These hens also showed mild to

gross ataxia, and equivocal or negative histopathological changes in the spinal cord and peripheral nerves.

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

UF — The uncertainty factor of 3000 includes uncertainties in extrapolation from laboratory animals to humans (10A), subchronic to chronic exposure (10S), sensitive human subpopulations (10H) and an incomplete database.

MF — None

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

Data Considered for Establishing the RfD

- 1) 90-Day Oral - hen: Principal study - see previous description; no core grade ( Abou-Donia et al., 1980)
- 2) 90-Day Feeding - rat: NOEL=20 ppm (1.8 mg/kg/day); LEL=35.2 ppm ([3.8 mg/kg/day] reduced brain ChE activity]; no core grade (Virginia Carolina Chemical Corp., 1960a)
- 3) 90-Day Feeding - rat: ChE NOEL=0.5 mg/kg/day; Systemic NOEL=0.5 mg/kg/day; LEL=2.5 mg/kg/day (increased liver weight); no core grade (Virginia Carolina Chemical Corp., 1960b)
- 4) 90-Day Feeding - rat: ChE and systemic NOEL=25 mg/kg/day; no core grade (Virginia Carolina Chemical Corp., 1958a)
- 5) 90-Day Feeding - dog: ChE NOEL=0.75 mg/kg/day; LEL=2.5 mg/kg/day (plasma ChE inhibition); no core grade (Virginia Carolina Chemical Corp., 1957)
- 6) 112-Day Feeding - rat: ChE NOEL=0.1 mg/kg/day; LEL=0.25 mg/kg/day (RBC ChE inhibition in females); no core grade (Virginia Carolina Chemical Corp., 1958b)
- 7) 40-Day Feeding - rat: ChE and Systemic NOEL=1 mg/kg/day; no core grade (Virginia Carolina Chemical Corp., 1958c)

Data Gaps: None

### **I.A.5. Confidence in the Oral RfD**

Study — Low  
Database — Low  
RfD — Low

The low confidence assigned to the critical study is due to design deficiencies. Supporting data are too limited to merit a confidence greater than low. Low confidence in the RfD follows.

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

Source Document — This assessment is not presented in any existing U.S. EPA document.

Other EPA Documentation — Pesticide Registration Files

Agency Work Group Review — 11/21/1985, 08/13/1987

Verification Date — 08/13/1987

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 Merphos 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.

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

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

Substance Name — Merphos  
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The health effects data for Merphos (orthophosphate defoliant) have been reviewed by the U.S. EPA RfD/RfC Work Group and determined to be inadequate for derivation of an inhalation RfC.

Agency Work Group Review — 06/25/1992

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 Merphos 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.

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

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

Substance Name — Merphos  
CASRN — 150-50-5

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

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**III. [reserved]**

**IV. [reserved]**

**V. [reserved]**

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## **VI. Bibliography**

Substance Name — Merphos  
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### **VI.A. Oral RfD References**

Abou-Donia, M.B., D.G. Graham, P.R. Timmons and B.L. Reichert. 1980. Late acute, delayed neurotoxic and cholinergic effects of S,S,S-tributyl phosphoro- trithioite (merphos) in hens. *Toxicol. Appl. Pharmacol.* 53: 439-457.

Virginia Carolina Chemical Corporation. 1957. MRID No. 00089576. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Virginia Carolina Chemical Corporation. 1958a. MRID No. 00089576. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Virginia Carolina Chemical Corporation. 1958b. MRID No. 00089578. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Virginia Carolina Chemical Corporation. 1958c. MRID No. 00108720. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Virginia Carolina Chemical Corporation. 1960a. MRID No. 00089580. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Virginia Carolina Chemical Corporation. 1960b. MRID No. 00089572. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

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### **VI.B. Inhalation RfC References**

None available

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

None

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## VII. Revision History

Substance Name — Merphos  
CASRN — 150-50-5

Date	Section	Description
09/07/1988	I.A.	Oral RfD summary on-line
11/01/1992	I.B.	Not verified; data inadequate
10/28/2003	I.A.6., I.B.	Screening-Level Literature Review Findings message has been added.

## VIII. Synonyms

Substance Name — Merphos  
CASRN — 150-50-5  
Last Revised — 09/07/1988

- 150-50-5
- chemagro B-1776
- deleaf defoliant
- Easy Off-D
- folex
- Merphos
- phosphorotrithious acid, tributyl ester
- phosphorotrithious acid, s,s,s-tributyl ester
- S,S,S-tributyl phosphorotrithioite
- S,S,S-tributyl trithiophosphite
- tributyl phosphorotrithioite
- tributylthiofosfin