

METHYL IODIDE

CASRN: 74-88-4

From the National Library of Medicine TOXNET Hazardous Substances Data Bank at <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>

Animal Toxicity Studies:

Evidence for Carcinogenicity:

Evaluation: No epidemiological data relevant to the carcinogenicity of **methyl iodide** were available. There is limited evidence in experimental animals for the carcinogenicity of **methyl iodide**. Overall evaluation: **Methyl iodide** is not classifiable as to its carcinogenicity to humans (Group 3).

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).71 1506 (1999)]**QC REVIEWED**

Non-Human Toxicity Excerpts:

... /AFTER/ 15 MIN EXPOSURE TO 22 MG/L IN AIR (3790 PPM). RATS DIED WITHIN ... 11 DAYS. LUNG IRRITATION & PULMONARY EDEMA /WERE NOTED AT NECROPSY/.

[Clayton, G.D., F.E. Clayton (eds.) Patty's Industrial Hygiene and Toxicology. Volumes 2A, 2B, 2C, 2D, 2E, 2F: Toxicology. 4th ed. New York, NY: John Wiley & Sons Inc., 1993-1994.4031]**PEER REVIEWED**

EXPOSURE OF MICE TO ... LETHAL CONC OF VAPOR (25-85 MG/L OF AIR) ... CAUSED IMMEDIATE IRRITATION OF EYES ... EXPOSURE TO ... 5 MG/L OF AIR FOR 10 MIN CAUSED NO SIGNS OF IRRITATION OF EYES IN MOST ANIMALS, ALTHOUGH ALL DIED WITHIN NEXT DAY.

[Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986.620]**PEER REVIEWED**

... **METHYL IODIDE** IS MUTAGENIC TO SALMONELLA TYPHIMURIUM TA100 WHEN PLATES ARE EXPOSED TO VAPORS ...

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).V15 250 (1977)]**PEER REVIEWED**

THE EFFECT OF **METHYL IODIDE** ON NERVOUS SYSTEM OF POISONED RABBITS WAS MANIFESTED BY INCREASE SUSCEPTIBILITY TO D-TUBOCURARINE. METABOLIC DISTURBANCES OF ATP, CREATININE PHOSPHATE, LACTATE, PHOSPHATIDYLSERINE & PHOSPHATIDYLCHOLINE WERE OBSERVED IN BRAIN TISSUES. MOST SERIOUS EFFECT ON BLOOD SYSTEM WAS MARKED INCR OF SERUM TRIGLYCERIDE.
[HASEGAWA H ET AL; IND HEALTH 9 (1-2): 36-45 (1971)]**PEER REVIEWED**

Iodomethane/ (57 mg/kg/day) was administered sc to male rabbits on two successive days ... induced a marked hyperlipidemia ... /with an/ 11-fold incr in very low density lipoproteins and a three-fold incr in low-density lipoproteins ... /along with an/ enhancement of triglyceride production ... /and an/ incr insulin resistance, and hyperinsulinemia were also observed ...
[Matsui H et al; Toxicol Appl Pharmacol 65 (2): 245-9 (1982)]**PEER REVIEWED**

Iodomethane/ had little influence on the productivity /of adults of *Trogoderma granarium* following fumigation of the larvae/.
[Rajendran S; Bull Entomol Res 72 (2): 247-51 (1982)]**PEER REVIEWED**

... **Iodomethane** is generally regarded to be carcinogenic in animals.
[USEPA; Ambient Water Quality Criteria Doc: Halomethanes p.C-59 (1980) EPA 442/5-80-051]**PEER REVIEWED**

The relative toxicity of 7 fumigants to the 4 life cycle stages of *Callosobruchus chinensis* (a pest of stored cowpeas) was determined in the laboratory. Their relative toxicities to all stages of the insect were phosphine > **methyl iodide** > acrylonitrile > methyl bromide > ethylene dibromide > methyl formate > ethyl formate.
[Adu OO, Muthu M; Insect Sci Appl 6 (1): 75-8 (1985)]**PEER

REVIEWED**

A simple rapid determination of glutathione (GSH) and cytoplasmic protein bound SH groups (PSSH), appropriate to study their relationship in tissues, in rat liver, kidney, and testis was developed. Hepatic glutathione and protein bound SH were measured after treatment with **methyl iodide** (400, 800 mg/kg, after 0.5 hr). ... **Methyl iodide** ... showed a decrease of glutathione and protein bound SH.

[Di Simplicio P et al; Boll Soc Ital Biol Sper 60 (6): 1161-7 (1984)]**PEER REVIEWED**

Blood and liver glutathione levels were measured under the effect of an acute exposure to high doses of glutathione-depleting substances. Among direct-acting glutathione-depleting substances, diethyl maleate (0.3, 0.7, and 1.4 ml/kg) caused a marked reduction of both blood and liver glutathione, whereas **methyl iodide** (320 mg/kg) led to a decrease in liver glutathione stores immediately and in blood stores with a longer latency.

[Di Simplicio P et al; J Appl Toxicol 4 (5): 227-9 (1984)]**PEER REVIEWED**

The monohalomethanes are alkylating agents and thus have generated concern as to their potential for inducing mutations and cancer. All compounds tested were found to be direct acting mutagens in the Ames test. They also demonstrated the ability to produce cancer in mice and rats. ... On the basis of these data, NIOSH recommends that ... **methyl iodide** be considered as a potential occupational carcinogen.

[NIOSH; Monohalomethanes: Methyl Chloride, Methyl Bromide, Methyl Iodide. p.22 (9/27/84)]**PEER REVIEWED**

Depigmentation was produced in mice intradermally injected with nitrogen mustard. The effect in C57 black mice was greater than in CBA brown mice, the females being more sensitive than males. Other alkylating agents which caused depigmentation were ... **methyl iodide** (50 ug). ... Depigmentation was also seen after intradermal injection of known tumor promoters and phenols; however, it was not caused by carcinogens which required metabolic activation even following pretreatment with phenobarbitone or methylcholanthrene to enhance such activation.

[Aw TC, Boyland E; IRCS Med Sci Libr Compend 9 (1): 29-30

(1981)]**PEER REVIEWED**

The quantitation of newly induced trifluorothymidine resistant and 6-thioguanine resistant mutants in TK + or - 3.7.2(C) mouse lymphoma cells was analyzed using conventional soft agar cloning and a newly developed technique that allowed for the sequestering, expression, and selection of mutants in Linbro wells. The conventional method of cloning in semi-soft agar supplemented nutrient medium provided maximum mutant frequencies at 1-3 days posttreatment for trifluorothymidine resistance and 5-8 days for 6-thioguanine resistance. The length of time required to reach maximum expression was mutagen- and dose-dependent. Following complete expression, TK-deficient mutants induced by **iodomethane** declined in frequency.

[Moore MM, Clive D; Environ Mutagen 4 (4): 499-519 (1982)]**PEER REVIEWED**

Chemical mutagens including **iodomethane** have been classified as chromosomal mutagens in a L5178Y/thymidine kinase gene mutation assay. ... /The researchers/ observed mutagen-dependent increases in small thymidine kinase-deficient mutant colonies with detectable damage to the chromosome that carries the thymidine kinase locus. In this study, /the authors/ tested these ... chemicals for the induction of gene mutations at the ouabain-resistance (ouares) locus of 3.7.2(C) L5178Y cells to determine if presumptive chromosomal mutagens would go undetected at a gene locus that is unresponsive to chromosomal damage. A final concentration of 375 micrograms/ml ouabain in soft-agar medium selected against the ouabain-sensitive phenotype without loss of the mutagen-induced ouabain-resistant phenotype. Verification of the mutant phenotype was completed for six individual soft-agar ouares colonies derived from mutagen-treated cultures via growth for 10-11 days in nonselective medium followed by retesting for colony formation in selective soft-agar medium. Dose-related reproducible increases in the frequency of ouabain-resistant mutants were observed for 3.7.2(C) L5178Y cells that had been exposed for 3 hr to 1.9-3.6 ug/ml iodomehtane.

[Amacher DE, Dunn EM; Environ Mutagen 7 (4): 523-33 (1985)]**PEER REVIEWED**

Groups of BD rats (substrain and sex unspecified), about 100 days

old, received weekly subcutaneous injections of 10 (16 animals) or 20 mg/kg body weight (eight animals) **methyl iodide** (purity unspecified) in arachis oil for about one year (total dose, 500 or 900 mg/kg body weight), or a single subcutaneous injection of 50 mg/kg body weight (14 animals), and were observed for life. Four and two animals in the first two groups, respectively, died of pneumonia. Subcutaneous sarcomas occurred in 9/12 rats injected with 10 mg/kg body weight, in 6/6 rats injected with 20 mg/kg body weight and in 4/14 rats given a single injection of 50 mg/kg body weight. No subcutaneous tumor was reported to have occurred in control rats ... injected with arachis oil alone. Local tumors occurred more than one year after the first injection; histologically, these were fibrosarcomas and spindle-cell and round-cell sarcomas. In most cases ... pulmonary and lymph-node metastases were observed.

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).V41 218 (1986)]**PEER REVIEWED**

Groups of 10 male and 10 female A/He mice, six to eight weeks old, were injected intraperitoneally thrice weekly with three dose levels (the highest being the maximum tolerated dose) of **methyl iodide** (> 98% pure) in tricapyrylin for a total of 24 injections (total doses, 8.5, 21.3 and 44.0 mg/kg body weight). A group of 30 untreated mice and a group of 160 tricapyrylin-treated mice were used as controls. All survivors were killed 24 weeks after the first injection. Survival was 29/30 and 154/160 in the untreated and vehicle-treated control groups and 19/20 in the low-dose, 20/20 in the mid-dose and 11/20 in the higher dose groups. Proportions of mice with lung tumors were 6/29, 34/154, 4/19, 6/20 and 5/11 in the five groups, respectively (p= 0.048; one sided Cochran-Armitage trend test using vehicle controls only). Average numbers of lung tumors per mouse were 0.21, 0.22, 0.21, 0.30 and 0.55. In positive-control groups receiving a single intraperitoneal injection of 10 or 20 mg urethane, all animals developed lung tumors; the average number of lung tumors per animal was 8.1 in the low-dose and 17.8 in the high-dose group.

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).41

218 (1986)]**PEER REVIEWED**

Toxic effects ... observed after exposure to **methyl iodide** include /SRP: CNS depression/, congestion of the lungs, and liver and kidney damage. No death was observed after daily administration of oral doses of 30-50 mg/kg body weight **methyl iodide** to rats on five days per week for a month.

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).V41 219 (1986)]**PEER REVIEWED**

Oral administration to rats of **methyl iodide** reduced nonprotein thiol concentrations in liver and kidney.

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).V41 219 (1986)]**PEER REVIEWED**

Methyl iodide induces DNA damage and is mutagenic to bacteria in the presence or absence of an exogenous metabolic system. It induces mitotic recombination in yeast. It induces transformation in Syrian hamster embryo cells but not in C3H 10T1/2 cells.

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).V41 222 (1986)]**PEER REVIEWED**

Iodomethane injected sc into rabbits elevated the basal levels of glucagon and insulin, decreased the response of plasma glucose to injected insulin, and produced abnormal responses in a glucose-tolerance test. With regard to the latter, an iv injection of glucose into the treated animals produced a biphasic increase in plasma glucose, an increase in plasma insulin greater than that of controls, and an increase in glucagon not seen in controls. Thus, **iodomethane** resulted in disturbances in the mechanisms regulating carbohydrate metabolism.

[Matsui H et al; Horm Metab Res 14 (12): 676-7 (1982)]**PEER REVIEWED**

Male rabbits were injected sc with 57 mg/kg of **methyl iodide** for 2 days and their lipid metabolism was examined 48 hr after the last injection. The plasma triglyceride levels increased from the

preinjection average of 56.1 mg/dl to 246.0 mg/dl. Analysis of the lipoprotein profile of plasma showed a significant increase of very-low-density lipoproteins. The rate of triglyceride secretion into plasma, measured by Triton WR 1339 injection method, was significantly higher in the animals treated with **methyl iodide** than in the controls. Histological examination of the liver showed diffuse fat deposits in the hepatocytes without any destructive and inflammatory changes. Thus, hyperlipidemia and fatty liver of rabbits induced by **methyl iodide** was related to the elevation of triglyceride synthesis and its secretion in the liver.

[Matsui H et al; Sangyo Igaku 24 (1): 85-9 (1982)]**PEER REVIEWED**

Methyl iodide induces ... mutations in cultured mammalian cells.

[IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work).V41 222 (1986)]**PEER REVIEWED**

... **Methyl iodide** /is/ about six times as acutely toxic as methyl bromide to mice; the minimal fatal dose with 24 hr exposure being about 75 ppm. ... Ten times as acutely toxic as carbon tetrachloride.

[American Conference of Governmental Industrial Hygienists, Inc. Documentation of the Threshold Limit Values and Biological Exposure Indices. 6th ed. Volumes I, II, III. Cincinnati, OH: ACGIH, 1991.1013]**PEER REVIEWED**

Non-Human Toxicity Values:

LCLO Mouse inhalation 78,693 ppm/10 min.

[Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983.855]**PEER REVIEWED**

LCLO Mouse inhalation 18,109 ppm/30 min

[Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983.855]**PEER REVIEWED**

LD50 RAT ORAL 76 MG/KG.

[JOHNSON MK; BIOCHEM J 98 (1): 38-43 (1966)]**PEER REVIEWED**

LC50 Mouse inhalation 5 mg/l/57 min

[Clayton, G.D., F.E. Clayton (eds.) Patty's Industrial Hygiene and Toxicology. Volumes 2A, 2B, 2C, 2D, 2E, 2F: Toxicology. 4th ed. New York, NY: John Wiley & Sons Inc., 1993-1994.4031]**PEER REVIEWED**

LC50 Rat ihl 1300 mg/cu m/4 hr

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996.2252]**PEER REVIEWED**

LD50 Rat ip 101 mg/kg

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996.2252]**PEER REVIEWED**

LD50 Rat sc 110 mg/kg

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996.2252]**PEER REVIEWED**

LD50 Mouse ip 172 mg/kg

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996.2252]**PEER REVIEWED**

LD50 Mouse sc 110 mg/kg

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996.2252]**PEER REVIEWED**

LD50 Guinea pig ip 51 mg/kg

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996.2252]**PEER REVIEWED**