

ENVIRONMENTAL CONTAMINANTS ENCYCLOPEDIA

MINERAL OIL, GENERAL ENTRY

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This document was put together by human beings, mostly by compiling or summarizing what other human beings have written. Therefore, it most likely contains some mistakes and/or potential misinterpretations and should be used primarily as a way to search quickly for basic information and information sources. It should not be viewed as an exhaustive, "last-word" source for critical applications (such as those requiring legally defensible information). For critical applications (such as litigation applications), it is best to use this document to find sources, and then to obtain the original documents and/or talk to the authors before depending too heavily on a particular piece of information.

Like a library or many large databases (such as EPA's national STORET water quality database), this document contains information of variable quality from very diverse sources. In compiling this document, mistakes were found in peer reviewed journal articles, as well as in databases with relatively elaborate quality control mechanisms [366,649,940]. A few of these were caught and marked with a "[sic]" notation, but undoubtedly others slipped through. The [sic] notation was inserted by the editors to indicate information or spelling that seemed wrong or misleading, but which was nevertheless cited verbatim rather than arbitrarily changing what the author said.

Most likely additional transcription errors and typos have been added in some of our efforts. Furthermore, with such complex subject matter, it is not always easy to determine what is correct and what is incorrect, especially with the "experts" often disagreeing. It is not uncommon in scientific research for two different researchers to come up with different results which lead them to different conclusions. In compiling the Encyclopedia, the editors did not try to resolve such conflicts, but rather simply reported it all.

It should be kept in mind that data comparability is a major problem in environmental toxicology since laboratory and field methods are constantly changing and since there are so many different "standard methods" published by EPA, other federal agencies, state agencies, and various private groups. What some laboratory and field investigators actually do for standard operating practice is often a unique combination of various standard protocols and impromptu "improvements." In fact, the interagency task force on water methods concluded that [1014]:

It is the exception rather than the rule that water-quality monitoring data from different programs or time periods can be compared on a scientifically sound basis, and that...

No nationally accepted standard definitions exist for water quality parameters. The different organizations may collect data using identical or standard methods, but identify them by different names, or use the same names for data collected by different methods [1014].

Differences in field and laboratory methods are also major issues related to (the lack of) data comparability from media other than water: soil, sediments, tissues, and air.

In spite of numerous problems and complexities, knowledge is often power in decisions related to chemical contamination. It is therefore often helpful to be aware of a broad universe of conflicting results or conflicting expert opinions rather than having a portion of this information arbitrarily censored by someone else. Frequently one wants to know of the existence of information, even if one later decides not to use it for a particular application. Many would like to see a high percentage of the information available and decide for themselves what to throw out, partly because they don't want to seem uninformed or be caught by surprise by potentially important information. They are in a better position if they can say: "I knew about that data, assessed it based on the following quality assurance criteria, and decided not to use it for this application." This is especially true for users near the end of long decision processes, such as hazardous site cleanups, lengthy ecological risk assessments, or complex natural resource damage assessments.

For some categories, the editors found no information and inserted the phrase "no information found." This does not necessarily mean that no information exists; it

simply means that during our efforts, the editors found none. For many topics, there is probably information "out there" that is not in the Encyclopedia. The more time that passes without encyclopedia updates (none are planned at the moment), the more true this statement will become. Still, the Encyclopedia is unique in that it contains broad ecotoxicology information from more sources than many other reference documents. No updates of this document are currently planned. However, it is hoped that most of the information in the encyclopedia will be useful for some time to come even without updates, just as one can still find information in the 1972 EPA Blue Book [12] that does not seem well summarized anywhere else.

Although the editors of this document have done their best in the limited time available to insure accuracy of quotes or summaries as being "what the original author said," the proposed interagency funding of a bigger project with more elaborate peer review and quality control steps never materialized.

The bottom line: The editors hope users find this document useful, but don't expect or depend on perfection herein. Neither the U.S. Government nor the National Park Service make any claims that this document is free of mistakes.

The following is one chemical topic entry (one file among 118). Before utilizing this entry, the reader is strongly encouraged to read the README file (in this subdirectory) for an introduction, an explanation of how to use this document in general, an explanation of how to search for power key section headings, an explanation of the organization of each entry, an information quality discussion, a discussion of copyright issues, and a listing of other entries (other topics) covered.

See the separate file entitled REFERENC for the identity of numbered references in brackets.

HOW TO CITE THIS DOCUMENT: As mentioned above, for critical applications it is better to obtain and cite the original publication after first verifying various data quality assurance concerns. For more routine applications, this document may be cited as:

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on the internet or NTIS: 1998).

Mineral Oil, General (Also includes discussion of mineral oil pharmaceuticals (CAS number 8012-95-1))

Brief Introduction:

Br.Class: General Introduction and Classification Information:

There are many different types of "mineral oils," with many different CAS numbers [617,620]. Sax lists 33 different substances starting with the phrase mineral oil, all having different CAS numbers [620]. Various State and other toxic substances lists include the following substances which include the phrase mineral oil (Vera Hudson of the National Library of Medicine, personal communication, 1993):

Illinois and Massachusetts' Toxic Substances Lists, New Jersey Right to Know List, OSHA PELs List of Hazardous Substances [371]:

CAS number 8012-95-1; Oil mist, mineral

Massachusetts Toxic Substances List:

CAS 64741497; Mineral oil, petroleum condensates, vacuum tower

CAS 64741500; Mineral oil, petroleum distillates, light paraffinic

CAS 64741511; Mineral oil, petroleum distillates, heavy paraffinic

CAS 64741522; Mineral oil, petroleum distillates, light naphthenic

CAS 64741533; Mineral oil, petroleum distillates, heavy naphthenic

CAS 64741895; Mineral oil, petroleum distillates, solvent-refined light paraffinic

CAS 64741975; Mineral oil, petroleum distillates, solvent-refined light naphthenic

CAS 64742036; Mineral oil, petroleum extracts, light naphthenic distillate solvent

CAS 64742047; Mineral oil, petroleum extracts, heavy paraffinic distillate solvent

CAS 64742058; Mineral oil, petroleum extracts,

light paraffinic distillate solvent

CAS 64742105; Mineral oil, petroleum extracts,
residual oil solvent

CAS 64742116; Mineral oil, petroleum extracts,
heavy naphthenic distillate solvent

CAS 64742172; Mineral oil, petroleum residual
oils, acid-treated

CAS 64742183; Mineral oil, petroleum
distillates, acid-treated heavy naphthenic

CAS 64742194; Mineral oil, petroleum
distillates, acid-treated light naphthenic

CAS 64742207; Mineral oil, petroleum
distillates, acid-treated heavy paraffinic

CAS 64742218; Mineral oil, petroleum
distillates, acid-treated light paraffinic

CAS 64742536; Mineral oil, petroleum
distillates, hydrotreated light naphthenic

CAS 64742558; Mineral oil, petroleum
distillates, hydrotreated light paraffinic

CAS 64742569; Mineral oil, petroleum
distillates, solvent-dewaxed light paraffinic

CAS 64742649; Mineral oil, petroleum
distillates, solvent-dewaxed light naphthenic

CAS 64742683; Mineral oil, petroleum
naphthenic oils, catalytic dewaxed heavy

CAS 64742694; Mineral oil, petroleum
naphthenic oils, catalytic dewaxed light

CAS 64742707; Mineral oil, petroleum paraffin
oils, catalytic dewaxed heavy

CAS 64742718; Mineral oil, petroleum paraffin
oils, catalytic dewaxed light

Illinois Toxic Substances List:

CAS 8020835; Untreated and mildly treated
mineral oils.

Thus, when considering "mineral oil," it is first
necessary to determine "which one?" Many substances

beginning with term mineral oil are known carcinogens and mutagens [620].

However, this entry refers only to mineral oils with CAS number 8012-95-1), including Adepsineoil, Primol 355, Perfecta Primol D, and their HSDB and RTECs synonyms. The "mineral oils" being discussed in this entry are generally used in pharmaceutical agents [609].

Some people confuse these mineral oil pharmaceuticals, with mineral spirits, which is a related but different product with a different CAS number (64475-85-1) having uses similar to turpentine (see separate Mineral Spirits entry). A third substance sometimes called "Mineral Oils" [480] (CAS number 8007-45-2) is more often called Coal-Tar or Tar [617] and is recognized as a definite human carcinogen [480].

Determining which mineral oil or mineral spirit product one is dealing with is not always easy. For example, at a hardware store, a can with mineral spirits on the label gave the ingredients as CAS 8052-41-3 (Roy Irwin, personal communication, 1996). CAS 8052-41-3 is actually assigned to stoddard solvent, one kind of mineral spirits. However, to add to the confusion, Stoddard solvents may sometimes be referred to as mineral spirits or (wrongly) as mineral oil. Stoddard solvent is not covered by this entry. The Agency for Toxic Substances and Disease Registry (ATSDR) published a toxicological profile for stoddard solvent in 1995, and that document should be consulted for information on the stoddard solvent subset group of mineral spirits.

There does not appear to be an ATSDR toxicological profile on the subject of mineral oils in general or upon mineral oil pharmaceuticals. See also: Mineral Spirits entry. The ATSDR profile on mineral-based crankcase oil is about used motor oil, a totally separate substance [961] (see Oil, Used Motor Oil entry).

Mineral oil is a highly refined oil that consists of saturated hydrocarbons [497]. According to the U.S. Coast Guard Emergency Response Notification System (ERNS), "mineral oil" is one of the most commonly spilled petroleum products in the U.S. [635]. However, possibly many different mineral oil substances, including the many industrial use mineral oils [617,620] are lumped into the general heading of "mineral oil" when spilled.

Petroleum distillates in order of decreasing volatility include [363]:

1. Petroleum ether or benzine
2. Gasoline

3. Naphtha
4. Mineral spirits
5. Kerosene
6. Fuel oils
7. Lubricating oils
8. Paraffin wax
9. Asphalt or tar.

However, many different substances are sometimes called mineral spirits, mineral oils, or lubricating oils. Some of the carcinogenic mineral oils used to lubricate cutting lathes have been associated with occupational cancer in machine shop workers. Again, when considering a "mineral oil," it is first necessary to determine which one is being considered.

Br.Haz: General Hazard/Toxicity Summary:

For humans, the overall hazard rating is:

May cause irreversible effects which can be life threatening [369].

In humans, mineral oil use can cause a variety of untoward effects (such as decreased absorption of vitamin A), so habitual use on mineral oil should be avoided [609]. Mineral oils used as lubricants for metal workers have been associated with increased occupational risk of skin cancer.

In humans, the following potential problems or symptoms have been observed [609]:

If it gains access to lungs. mineral oil produces lipid pneumonitis. Although more frequently observed when oil was used as vehicle for application of drugs to nasal mucous membranes, lipid pneumonitis can also occur following oral ingestion of oil, particularly if taken at bedtime (Gilman, A. G., L. S. Goodman, and A. Gilman.,eds.,. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 1009).

Leakage of oil past anal sphincter is an annoying side effect and an occasional cause of pruritus ani. It is also claimed that oil interferes with healing of postoperative wounds in anorectal region and that continuous presence of oil in rectum disturbs normal defecatory reflexes. (Gilman, A. G., L. S. Goodman, and A. Gilman.,eds.,. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan

Publishing Co., Inc. 1980. 1009).

Mineral oil acts as a lipid solvent; administered with meals, it may interfere with absorption of essential fat-soluble substances. Regular ingestion of mineral oil during pregnancy may reduce absorption of vitamin k & produce hypoprothrombinemia. /In intestinal tract. Elicits typical foreign-body reaction in intestinal mucosa, mesenteric lymph nodes, liver, and spleen. Although no physiological disturbances have been related to presence of oil at these sites, it must be questioned whether /oil/Can be used safely over long periods of time. [Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 1009].

If taken continuously in large amt it may impair appetite [Osol, A. (ed.). Remington's Pharmaceutical Sciences. 16th ed. Easton, Pennsylvania: Mack Publishing Co., 1980. 746].

In nasal drops & sprays/...Oil gravitates to lower lobes of lungs, where it sets up a granulomatous reaction, followed by marked fibrosis & encystment. Daily oral doses of 30-90 ml for many months has produced the same effect. The fatality of this complication is high. [Thienes, C., and T.J. Haley. Clinical Toxicology. 5th ed. Philadelphia: Lea and Febiger, 1972. 192].

In an instance of possible embolism from an oil injection, one pt had rapid loss of vision, severe headache, convulsions, & coma immediately after injection of...Mineral oil prepn, granugenol, into pleural cavity in treatment of empyema. Recovering gradually...Within 3 wk vision had returned essentially to normal. [Grant, W. M. Toxicology of the Eye. 2nd ed. Springfield, Illinois: Charles C. Thomas, 1974. 803].

Massive visceral lipid deposition following the prolonged oral use of mineral oil is reported. [Nochomovitz LE, Uys CJ; Massive visceral lipid deposition following prolonged mineral oil ingestion; S Afr J Lab Clin Med 20 (2): 1226 (1974)].

Possible hazards associated with mineral oil include impurities such as polycyclic aromatic hydrocarbons (PAHs) [609]. Polynuclear aromatic compounds have been detected in samples of mineral oil for medicinal and

cosmetic uses [609]. We have not yet located a list of concentrations PAHs and alkyl PAHs in typical mineral oils, so the risk to non-human biota is impossible to summarize. However, carcinogenicity and general hazard of PAHs would likely be among the potential hazards to both humans and non-human species, and expanded scans of PAHs and alkyl PAHs [828] should be used to assess the PAH constituents of spills. See also: PAHs as a group entry.

Mineral oil mist has little or no chronic or acute adverse effects upon humans [480].

Br.Car: Brief Summary of Carcinogenicity/Cancer Information:

Mineral oil is considered to be both carcinogenic and tumorigenic by RTECS criteria [607].

The debates on which PAHs, alkyl PAHs, and other aromatics in complex mixtures such as this product to classify as carcinogens, and the details of exactly how to perform both ecological and human risk assessments on the complex mixtures of aromatics typically found at contaminated sites, are likely to continue. There are some clearly wrong ways to go about it, but defining clearly right ways is more difficult. PAHs and other aromatics usually occur in complex mixtures rather than alone. Perhaps the most unambiguous thing that can be said about complex mixtures of PAHs and other aromatics is that such mixtures are often carcinogenic and possibly phototoxic. One way to approach site specific risk assessments would be to collect the complex mixture of PAHs and other lipophilic contaminants in a semipermeable membrane device (SPMD, also known as a fat bag) [894,895,896], retrieve the contaminant mixture from the SPMD, then test the mixture for carcinogenicity, toxicity, and phototoxicity (James Huckins, National Biological Service, and Roy Irwin, National Park Service, personal communication, 1996).

See also: PAHs as a group entry.

Br.Dev: Brief Summary of Developmental, Reproductive, Endocrine, and Genotoxicity Information:

Human teratogen by inhalation which causes testicular cancer in the fetus [620].

No reproductive data found [369].

No histological changes were observed in the livers or kidneys of chicken embryos exposed to 10 or 20 ul mineral oil, however embryos exposed to 20 ul mineral oil had

slight dilation of the heart [609].

Br.Fate: Brief Summary of Key Bioconcentration, Fate, Transport, Persistence, Pathway, and Chemical/Physical Information:

No information found on fate in soil, sediment or water; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Absorption, Distribution and Excretion [609]:

Mineral oil is absorbed to a limited extent from the intestinal tract... Stable emulsions of oil penetrate & soften stool more effectively than does non-emulsified oil... Emulsification enhances absorption of the oil. [Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 1009].

Vet: ...Parenterally, in...Vaccines to prolong antigen effect. Histological studies indicate that great deal of...Oil remains at injection site for long time, with macrophages picking up small amt & transporting it through lymphatic system. Its ultimate fate is still unknown. [Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974. 367].

Absorption...Is reportedly minimal following oral or rectal admin. /Heavy & light mineral oil/ [American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984.,p. 56:12].

Although 30-60% of orally admin...Emulsion reportedly is absorbed from intestine, some clinicians believe that there is no evidence that emulsion is absorbed to a greater extent than is nonemulsified mineral oil. [American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984.,p. 56:12].

On the basis of (14)c measurements in rats & squirrel monkeys given mineral oil emulsions incorporating n-[(14)c]hexadecane, sc or im, it was concluded that mineral oil was retained for a long time @ the injection site. After 1 month, greater than 60% was still present there, & after 10

months, greater than 25%. [The Chemical Society. Foreign Compound Metabolism in Mammals. Volume 2: A Review of the Literature Published Between 1970 and 1971. London: The Chemical Society, 1972. 112].

Synonyms/Substance Identification:

Environment Canada database [560]:

Mineral Oil
White Oil
Liquid Petroleum

Information from RTECS database [607]:

Adepsine oil
Alboline
Bayol 55
Bayol F
Blandlube
Crystol 325
Crystosol
Glymol
Kondremul
Liquid Paraffin
Neo-cultol
Nujol
Oil mist, mineral (ACGIH, OSHA)
Paraffin oil
Paroleine
Petrogalar
Primol 355
Primol D
Saxol

HSDB database [609]:

Flexon 845
Glymol
Heavy liquid petrolatum
Heavy mineral oil
Irgawax 361
Kaydol
Liquid petrolatum
Liquid vaseline
Petrolatum, liquid
Primol D
Shellflex 371N
Sunpar 150
Ultrol 7
Uvasol
White mineral oil
White oils

Balneol
Blandlube
Kondremul
MagieSol 44
Mineral oils
Neo-Cultol
Paraffins
Petrogalar
Petrolatum, liq
Agoral
Alpha Keri
Keri Lotion
Crystosol
Drakeol
Fonoline
Bayol 55
Molol
Parol
Peneteck
Penreco
Perfecta
Primol 355
Protopet
Tech Pet F

Associated Chemicals or Topics (Includes Transformation Products):

Site Assessment-Related Information Provided by Shineldecker (Potential Site-Specific Contaminants that May be Associated with a Property Based on Current or Historical Use of the Property) [490]:

Associated Materials:

- Dimethyl sulfate

Sax lists 33 different substances starting with the phrase mineral oil, all having different CAS numbers [620].

Water Data Interpretation, Concentrations and Toxicity (All Water Data Subsections Start with "W."):

W.Low (Water Concentrations Considered Low):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W.High (Water Concentrations Considered High):

No information found; see Chem.Detail section for compounds in this product, then see individual compound

entries for summaries of information on individual components of this mixture.

W. Typical (Water Concentrations Considered Typical):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W. Concern Levels, Water Quality Criteria, LC50 Values, Water Quality Standards, Screening Levels, Dose/Response Data, and Other Water Benchmarks:

W. General (General Water Quality Standards, Criteria, and Benchmarks Related to Protection of Aquatic Biota in General; Includes Water Concentrations Versus Mixed or General Aquatic Biota):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W. Plants (Water Concentrations vs. Plants):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W. Invertebrates (Water Concentrations vs. Invertebrates):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W. Fish (Water Concentrations vs. Fish):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W. Wildlife (Water Concentrations vs. Wildlife or Domestic Animals):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W.Human (Drinking Water and Other Human Concern Levels):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

W.Misc. (Other Non-concentration Water Information):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sediment Data Interpretation, Concentrations and Toxicity (All Sediment Data Subsections Start with "Sed."):

Sed.Low (Sediment Concentrations Considered Low):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.High (Sediment Concentrations Considered High):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Typical (Sediment Concentrations Considered Typical):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Concern Levels, Sediment Quality Criteria, LC50 Values, Sediment Quality Standards, Screening Levels, Dose/Response Data and Other Sediment Benchmarks:

Sed.General (General Sediment Quality Standards, Criteria, and Benchmarks Related to Protection of Aquatic Biota in General; Includes Sediment Concentrations Versus Mixed or General Aquatic Biota):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Plants (Sediment Concentrations vs. Plants):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Invertebrates (Sediment Concentrations vs. Invertebrates):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Fish (Sediment Concentrations vs. Fish):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Wildlife (Sediment Concentrations vs. Wildlife or Domestic Animals):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Human (Sediment Concentrations vs. Human):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Sed.Misc. (Other Non-concentration Sediment Information):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil Data Interpretation, Concentrations and Toxicity (All Soil Data Subsections Start with "Soil."):

Soil.Low (Soil Concentrations Considered Low):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.High (Soil Concentrations Considered High):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.Typical (Soil Concentrations Considered Typical):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.Concern Levels, Soil Quality Criteria, LC50 Values, Soil Quality Standards, Screening Levels, Dose/Response Data and Other Soil Benchmarks:

Soil.General (General Soil Quality Standards, Criteria, and Benchmarks Related to Protection of Soil-dwelling Biota in General; Includes Soil Concentrations Versus Mixed or General Soil-dwelling Biota):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.Plants (Soil Concentrations vs. Plants):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.Invertebrates (Soil Concentrations vs. Invertebrates):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.Wildlife (Soil Concentrations vs. Wildlife or Domestic Animals):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Soil.Human (Soil Concentrations vs. Human):

No information found on this complex and variable mixture. See Chem.Detail section for chemicals

found in this product, then look up information on each hazardous compound. Some individual compounds found in petroleum products have low-concentration human health benchmarks for soil (see individual entries).

Soil.Misc. (Other Non-concentration Soil Information):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Tissue and Food Concentrations (All Tissue Data Interpretation Subsections Start with "Tis."):

Tis.Plants:

A) As Food: Concentrations or Doses of Concern to Living Things Which Eat Plants:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

B) Body Burden Residues in Plants: Typical, Elevated, or of Concern Related to the Well-being of the Organism Itself:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Tis.Invertebrates:

A) As Food: Concentrations or Doses of Concern to Living Things Which Eat Invertebrates:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

B) Concentrations or Doses of Concern in Food Items Eaten by Invertebrates:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

C) Body Burden Residues in Invertebrates: Typical, Elevated, or of Concern Related to the Well-being of the Organism Itself:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Tis.Fish:

A) As Food: Concentrations or Doses of Concern to Living Things Which Eat Fish (Includes FDA Action Levels for Fish and Similar Benchmark Levels From Other Countries):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

B) Concentrations or Doses of Concern in Food Items Eaten by Fish:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

C) Body Burden Residues in Fish: Typical, Elevated, or of Concern Related to the Well-being of the Organism Itself:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Tis.Wildlife: Terrestrial and Aquatic Wildlife, Domestic Animals and all Birds Whether Aquatic or not:

A) As Food: Concentrations or Doses of Concern to Living Things Which Eat Wildlife, Domestic Animals, or Birds:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

B) Concentrations or Doses of Concern in Food Items Eaten by Wildlife, Birds, or Domestic Animals (Includes LD50 Values Which do not Fit Well into Other Categories, Includes Oral Doses Administered in Laboratory Experiments):

Information from RTECS [607]:

MOUSE: LD50; ROUTE: Oral; DOSE: 22 gm/kg;
REFERENCE: Archiv fuer Toxikologie 30:243, 1973.

C) Body Burden Residues in Wildlife, Birds, or Domestic Animals: Typical, Elevated, or of Concern Related to the Well-being of the Organism Itself:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Tis.Human:

A) Typical Concentrations in Human Food Survey Items:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

B) Concentrations or Doses of Concern in Food Items Eaten by Humans (Includes Allowable Tolerances in Human Food, FDA, State and Standards of Other Countries):

Information from HSDB [609]:

FDA Requirements: FDA NUMBER: 121.1099;
Limitations: in defoaming agents limited to use in processing beet sugar & yeast; up to 150 ppm in yeast, measured as hydrocarbons. [Furia, T.E. (ed.). CRC Handbook of Food Additives. 2nd ed. Cleveland: The Chemical Rubber Co., 1972. 899].

Toxic Hazard Rating: 1= Practically non-toxic: probable oral lethal dose (human) above 15 g/kg, more than 1 quart (2.2 Lb) for 70 kg person (150 LB). [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984.,p. II-156].

C) Body Burden Residues in Humans: Typical, Elevated, or of Concern Related to the Well-being of Humans:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Tis.Misc. (Other Tissue Information):

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Bio.Detail: Detailed Information on Bioconcentration, Biomagnification, or Bioavailability:

No information found; see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Interactions:

Information from HSDB [609]:

Regular oral use may interfere with absorption of fat soluble vitamins...150 Ml daily to cows caused marked decr in carotene & tocopherol blood levels as well as accelerating postparturient decr in carotene, vitamin a ester, tocopherol, & xanthophyll in milk...It may also prevent growth of intestinal microorganisms as feeding it to rats produces vitamin k deficiency. [Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974. 366].

Decreased absorption of vitamin a may occur with concomitant admin of mineral oil. [Evaluations of Drug Interactions. 2nd ed. and supplements. Washington, DC: American Pharmaceutical Assn., 1976, 1978. 450].

The effect of warfarin may be potentiated due to interference with vitamin k absorption. [Miller, R. R., and D. J. Greenblatt. Handbook of Drug Therapy. New York: Elsevier North Holland, 1979. 1057 American Society of Hospital Pharmacists, to 1984.,p. 56:12].

Vet: orally, as a laxative with light grades (low viscosity) even having some advantage in animals over heavy grades (high viscosity). [Rossoff, I.S. Handbook of Veterinary Drugs. New York: Springer Publishing Company, 1974. 366].

Vet: A preparation that contains 0.5% neomycin, 1% carbaryl, 9% sulfacetamide, 0.5% tetracaine, and 88.1% mineral oil is used in treatment of ear infections and ear mite infestations of small animals, including rabbits... [Booth, N.H., L.E. McDonald (eds.). Veterinary Pharmacology and Therapeutics. 5th ed. Ames, Iowa: Iowa State University Press, 1982. 668].

Drug Warning [609]:

Can cause variety of untoward effects, & its use as a laxative requires appreciation of its potential

hazards... Habitual use of mineral oil must be avoided.

Indiscriminate use...By elderly, debilitated, or dysphagic individuals should be discouraged. [Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 1009].

Oral use for more than two weeks coats the mucosa of the small intestine and reduces the adsorption of vitamins, especially the fat-soluble vitamins (a, d, e, and k). The patient should be warned that lipid pneumonia may occur if mineral oil is aspirated and that untoward effects, such as hepatic infiltration, can result from its absorption. Because of the theoretical possibility that concurrent use of the various detergent docusate salts may further enhance the absorption of mineral oil, their concomitant administration is not recommended. [Osol, A. (ed.). Remington's Pharmaceutical Sciences. 16th ed. Easton, Pennsylvania: Mack Publishing Co., 1980. 1307].

Mineral oil still prescribed by some surgeons after anorectal surgery despite the fact that it sometimes causes pruritus ani, & laceration of the area from scratching or rubbing interferes with healing.[Osol, A. (ed.). Remington's Pharmaceutical Sciences. 16th ed. Easton, Pennsylvania: Mack Publishing Co., 1980. 1308].

Uses/Sources:

Information from HSDB [609]:

Ingredient in various pharmaceutical preparations [Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 952].

Formerly as a vehicle for drugs to be applied to nasal mucous membranes /light/ [Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 952].

Cathartic; vet: laxative, externally as a protectant, lubricant [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983. 1033].

Floor treatment [Hawley, G.G. The Condensed Chemical Dictionary. 10th ed. New York: Van Nostrand Reinhold Co., 1981. 774].

Lubricant in mfr of food products [Furia, T.E. (ed.). CRC Handbook of Food Additives. 2nd ed. Cleveland: The Chemical

Rubber Co., 1972. 402].

As a vehicle to dissolve or suspend medicinal agents [American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984.,p. 84:2408].

As detergent for removal of dermatological prepn /light/ [American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984.,p. 84:2408].

In cracking-flotation method of grain preservation [White-Stevens, R. (ed.). Pesticides in the Environment: Volume 3. New York: Marcel Dekker, Inc., 1977. 269].

In fungicides [White-Stevens, R. (ed.). Pesticides in the Environment: Volume 2. New York: Marcel Dekker, Inc., 1976. 90].

See petroleum oils. In insecticides; herbicides /petroleum oils/ [Farm Chemicals Handbook 1984. Willoughby, Ohio: Meister Publishing Co., 1984.,p. A-15].

Superfatting agent in soaps [KIRK-OTHTMER ENCYC CHEM TECH 3RD ED 1978-PRESENT V21 p.177].

Liquid defoamer in papermaking [KIRK-OTHTMER ENCYC CHEM TECH 3RD ED 1978-PRESENT V16 p.807].

Used in clear gel hair dressings [KIRK-OTHTMER ENCYC CHEM TECH 3RD ED 1978-PRESENT V12 p.95].

Pharmaceutical preparations (processing aids, intestinal lubricants); cosmetics (cold creams, hair preparations); food applicants (release agents, binders, flotation sealants, defoamants, protective coatings); food packaging and processing; chemical and plastics industry (processing medium, extenders, plasticizers); and animal feed products /medical white oils/ [IARC MONOGRAPHS 1972-PRESENT V33 p.112].

Cosmetics (hair oils, creams); textile-machine lubricants; horticultural sprays; wrapping paper; corrosion protection in meat-packing industry; and lubricants for watches, bicycles and spindles /technical white oils/ [IARC MONOGRAPHS 1972-PRESENT V33 p.112].

Forms/Preparations/Formulations:

Information from HSDB [609]:

Mineral oil, usp (liquid petrolatum), is available in numerous

prepn, often under various trade names. [Gilman, A. G., L. S. Goodman, and A. Gilman. (eds.). Goodman and Gilman's The Pharmacological Basis of Therapeutics. 6th ed. New York: Macmillan Publishing Co., Inc. 1980. 1009].

Agoral, plain (parke, davis), fleet mineral oil enema (fleet), kondremul plain (fisons), petrogalar, plain (wyeth) (all nonprescription). [American Medical Association, AMA Department of Drugs. AMA Drug Evaluations. 5th ed. Chicago: American Medical Association, 1983. 1308].

Domol (dome), lubath (warner/lambert), surfol (stiefel). [American Medical Association, AMA Department of Drugs. AMA Drug Evaluations. 4th ed. Chicago: American Medical Association, 1980. 1015].

Jelly, oral, 55% weight/weight (neo-cultol); oil (nujol); oil, rectal (fleet mineral oil enema); suspension, oral 1.6 Ml/5 ml (agoral plain); 2.75 Ml/5 ml (kondremul plain emulsion) & 3.25 Ml/5 ml (petrogalar plain). /Mineral oil, heavy/ [American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984.,p. 56:12].

Oil, rectal (saf-tip oil retention enema); oil (available by nonproprietary name). /Mineral oil, light/ [American Hospital Formulary Service. Volumes I and II. Washington, DC: American Society of Hospital Pharmacists, to 1984.,p. 56:12].

Britol (RE Carroll); Sontex (Marathon); Drakeol, Parol, Peneteck (Penreco); Sementol, Kaydol, Orzol, Gloria, Protol, Carnation, Klearol, Blandol, Rudol, Ervol, Benol (Witco) [CHEMCYCLOPEDIA 1986 p.124].

Medical /and technical/ white oils may contain alpha-tocopherol (Vitamin E) at levels up to 10 mg/kg as an antioxidant [IARC MONOGRAPHS 1972-PRESENT V33 p.94].

Chem.Detail: Detailed Information on Chemical/Physical Properties:

Caution: Every individual petroleum product has a unique "fingerprint," or distinct set of constituents most commonly identified by a gas chromatograph analysis. Due to the varying properties of the same general category of a petroleum product (each source and weathering stage of mineral oil has a unique gas chromatograph "fingerprint"), careful assessment of the toxicity, specific gravity, and other physical characteristics of each individual oil must be taken into consideration to determine the exact effects of the product on the environment. Therefore, the below comments on mineral oil are to be considered as representative, but not absolute values typical of every batch of the product with the same name.

Since PAHs are potentially important hazardous components of this product [609], risk assessments of spills of mineral oil should include analyses of PAHs and alkyl PAHs utilizing the NOAA protocol expanded scan [828] or other rigorous GC/MS/SIM methods.

Information from various sources:

DENSITY (g/mL) [560]:

For temperatures of oil (T) between 0 and 30 C:
Density = 0.97871 - 0.000710 T

NOTE: The densities of crude oils and oil products are dependent on the temperature and degree of weathering. The following density values are at "0% Weathering Volume" - in other words, fresh mineral oil.

Temp(C)	Density (at 0% Weathering Volume)
20	0.8205

Density/Specific Gravity [609]:

0.875-0.905 [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983. 1033].

Solubilities [609]:

Insol (sic, actually "relatively insoluble") in water, alcohol; sol in benzene, chloroform, ether, carbon disulfide, petroleum ether [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983. 1033].

Miscible with most fixed oils; not miscible with castor oil; sol in volatile oils [Osol, A. (ed.). Remington's Pharmaceutical Sciences. 16th ed. Easton, Pennsylvania: Mack Publishing Co., 1980. 746].

Additional Physicochemical information from Environment Canada [560]:

NOTE: In this section, for properties with more than one value, each value came from its own source; in other words, if API Gravity at 60 F was measured several times and several different answers were obtained, all of the answers are provided.

INTERFACIAL TENSIONS

NOTE: Interfacial tension is the force of attraction between molecules at the interface of a liquid. These tensions are essential for calculating the spreading rates and the likely extent to which the oil will form oil-in-water and water-in-oil emulsions. The interfacial tensions of crude oils and oil

products are dependent on the temperature and degree of weathering. The following tension values are at "0% Weathering Volume" - in other words, fresh mineral oil.

Air-Oil (mN/M or dynes/cm):

Temp(C)	Air-Oil Tension (at 0% Weathering Volume)
20	27

Temp(C)	Oil-Water (at 0% Weathering Volume)
20	47

FIRE AND REACTIVITY

Flash Point (C):
193 (O.C.)

SENSATION

Colour
Colourless

OTHER

Reid method Vapor Pressure (kPa):

Temp(C)	Pressure
367.8	0.689 (estimated)

Information from HSDB [609]:

Color/Form:

COLORLESS, OILY LIQ [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983. 1033].

Boiling Point:

360 DEG C [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 7th ed. Boston, Mass.: National Fire Protection Association, 1978.,p. 325M-146].

Surface Tension:

@ 25 Deg c slightly below 35 dynes/cm [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983. 1033].

Viscosity:

Kinematic viscosity not less than 38.1 Centistokes @ 37.8 Deg c [Osol, A. (ed.). Remington's Pharmaceutical Sciences. 16th ed. Easton, Pennsylvania: Mack Publishing

Co., 1980. 746].

Other Chemical/Physical Properties:

Develops not more than a faint odor of petroleum when heated; free or nearly free from fluorescence [Osol, A. (ed.). Remington's Pharmaceutical Sciences. 16th ed. Easton, Pennsylvania: Mack Publishing Co., 1980. 746].

Burned lube oil odor /oil mist (mineral)/ [American Conference of Governmental Industrial Hygienists, Inc. Documentation of the Threshold Limit Values, 4th ed., 1980. Cincinnati, Ohio: American Conference of Governmental Industrial Hygienists, Inc., 1980. 314].

Fate.Detail: Detailed Information on Fate, Transport, Persistence, and/or Pathways:

Little information found; see Br.Fate section above and also see Chem.Detail section for compounds in this product, then see individual compound entries for summaries of information on individual components of this mixture.

Laboratory and/or Field Analyses:

Expanded scans of PAHs and alkyl PAHs [828] should be used to assess the PAH and alkyl PAH constituents of spills. See also: PAHs as a group entry.

Summary Paragraph from Calabrese [867]:

Mineral oil is a highly refined oil that consists of saturated hydrocarbons. The thin-layer chromatography (TLC) pattern, using hexane as the eluting solvent, will appear as an oval-shaped spot with and Rf of 0.9 visible with iodine staining.

Discussion of TPH-Gasoline (TPH-G):

Total petroleum hydrocarbons, usually a GC/FID California modified EPA method 8015, based on a gasoline standard (gasoline used to calibrate instruments). In California, confusion often arises when [810]:

Crude oil, kerosene, and hydraulic oil contamination is sometimes reported as diesel fuel, while Naphtha, mineral spirits, or jet fuel contamination is sometimes reported as gasoline.

The problem is that these substances are neither gasoline nor diesel fuel, yet are reported as such [810].

Contaminants data from different labs, different states, and

different agencies, collected by different people, are often not very comparable (see also discussion in the disclaimer section at the top of this entry).

As of 1997, the problem of lack of data comparability (not only for water methods but also for soil, sediment, and tissue methods) between different "standard methods" recommended by different agencies seemed to be getting worse, if anything, rather than better. The trend in quality assurance seemed to be for various agencies, including the EPA and others, to insist on quality assurance plans for each project. In addition to quality control steps (blanks, duplicates, spikes, etc.), these quality assurance plans call for a step of insuring data comparability [1015,1017]. However, the data comparability step is often not given sufficient consideration. The tendency of agency guidance (such as EPA SW-846 methods and some other new EPA methods for bio-concentratable substances) to allow more and more flexibility to select options at various points along the way, makes it harder to insure data comparability or method validity. Even volunteer monitoring programs are now strongly encouraged to develop and use quality assurance project plans [1015,1017].

At minimum, before using contaminants data from diverse sources, one should determine that field collection methods, detection limits, and lab quality control techniques were acceptable and comparable. The goal is that the analysis in the concentration range of the comparison benchmark concentration should be very precise and accurate.

It should be kept in mind that quality control field and lab blanks and duplicates will not help in the data quality assurance goal as well as intended if one is using a method prone to false negatives. Methods may be prone to quality assurance problems due to the use of detection limits that are too high, the loss or addition of contaminants through inappropriate handling, looking for the wrong constituent compounds, or the use of inappropriate methods.

See also: Petroleum General and PAHs as a Group entries.