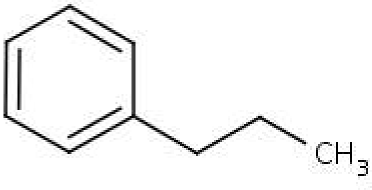
N-PROPYLBENZENE

CASRN: 103-65-1



For more information, search the NLM HSDB database.

Human Health Effects:

Human Toxicity Excerpts:
... IRRITATING TO MUCOUS MEMBRANES, EYES, NOSE, THROAT & SKIN. SYSTEMICALLY, IT CAUSES DEPRESSION OF CNS, HEADACHE, ANOREXIA, MUSCULAR WEAKNESS, INCOORDINATION, NAUSEA, VERTIGO, MENTAL CONFUSION, & UNCONSCIOUSNESS.
[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

The action of the alkylbenzenes under conditions of acute exposure resembles those of the general anesthetics. /Alkylbenzenes/
[Doull, J., C.D.Klassen, and M.D. Amdur (eds.). Casarett and Doull's Toxicology. 3rd ed., New York: Macmillan Co., Inc., 1986., p. 644] **PEER REVIEWED**

Skin, Eye and Respiratory Irritations:
... IRRITATING TO MUCOUS MEMBRANES, EYES, NOSE, THROAT & SKIN.
[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

Probable Routes of Human Exposure:
Occupational exposure to n-propylbenzene occurs through dermal contact and inhalation of vapor(1); absorption takes place by inhalation and in small quantities through intact skin(1).
[(1) Parmeggiani L; Encyl Occup Health & Safety 3rd ed Geneva, Switzerland: International Labour Office p. 1074-5 (1983)] **PEER REVIEWED**

NIOSH (NOHS Survey 1972-1974) has statistically estimated that 16,823 workers are potentially exposed to n-propylbenzene in the USA(1). Mean air levels of 0.1-0.2 ppm n-propylbenzene were detected inside two US factories involved in spray painting and glueing(2). Air samples collected inside a tire re-treading factory in Italy contained n-propylbenzene levels of 0-15 ug/cu m(2); a shoe sole factory (vulcanization area) had a level of 30-300 ug/cu m(2). Occupational exposure to n-propylbenzene may occur through inhalation and dermal contact with this compound at workplaces where n-propylbenzene is produced or used. The general population is continually exposed to n-propylbenzene through inhalation since it has been detected frequently in the atmosphere(SRC).
[(1) NIOSH; National Occupational Hazard Survey (NOHS) (1974) (2) Whitehead LW et al; Amer Ind Hyg Assoc J 45: 767-772 (1984) (3) Cocheo V et al; Amer Ind Hyg Assoc J 44: 521-7 (1983)] **PEER REVIEWED**

Body Burden:

n-Propylbenzene was qualitatively detected in 8 of 46 samples of human adipose tissue analyzed during the EPA National Human Adipose Tissue Survey in fiscal year 1982(1).

[(1) Onstat JD et al; Characterization of HRGC/MS Unidentified Peaks from the Broad Scan Analysis of the FY82 NHATS Composites. Vol I. EPA Contract No. 68-02-4252. Washington, DC: USEPA (1987)] **PEER REVIEWED**

Average Daily Intake:

AIR: Assuming an avg n-propylbenzene concn of 0.605-0.822 ug/cu m in urban-suburban outdoor air(1) and an inhalation rate of 20 cu m/day, the AVDI is 12.1-16.44 ug/day(SRC).

[(1) Shah JJ, Heyerdahl EK; National Ambient Volatile Organic Compounds (VOCs) Database Update. USEPA/600/3-88-010(a) Research Triangle Park, NC: USEPA p. 53 (1988)] **PEER REVIEWED**

Emergency Medical Treatment:

Emergency Medical Treatment:

EMT Copyright Disclaimer:

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The following Overview, *** HYDROCARBONS ***, is relevant for this HSDB record chemical.

Life Support:

o   This overview assumes that basic life support measures have been instituted.

Clinical Effects:

0.2.1 SUMMARY OF EXPOSURE

  0.2.1.1 ACUTE EXPOSURE

    A) USES: Hydrocarbons are a diverse group of organic compounds that are made up of primarily carbon and hydrogen atoms. Hydrocarbons are derived from petroleum, coal tar and natural gas, as well as from plants and animals. They may be classified as aliphatic (including the paraffins, olefins, acyclic terpenes, and acetylenes) and cyclic (including the alicyclics, aromatics and cyclic terpenes). Examples range from gasoline to essential oils to solvents. They are used as fuels and solvents, and are found in many household and commercial products.

B) PHARMACOLOGY: Pharmacology of hydrocarbons varies according to the specific substance. Some have sites of action in the CNS, namely increasing neurotransmitter binding and potentiating nicotinic blockade by interacting with acetylcholine receptors. Others stimulate GABA A activity. Glutamate release may be stimulated or transmission inhibited, depending on the specific agent. Glycine receptor activity may be augmented with certain hydrocarbons, and hydrocarbons are used as general anesthetics. In addition, alpha-2 adrenergic receptor activation can occur.

C) TOXICOLOGY: Hydrocarbons are a large and diverse group of substances with toxicity varying according to specific substance and route of exposure. Pneumonitis after aspiration is common and is the main route of injury from hydrocarbons. The exact mechanism of pulmonary toxicity is unclear but is likely due to direct toxicity to lung tissue as well as destruction of surfactant. Low viscosity, low surface tension and high volatility of a hydrocarbon (gasoline, for example, has all of these properties) increase the aspiration potential of that particular compound. Pulmonary toxicity can also occur after IV injection of hydrocarbons. Acute systemic toxicity is primarily due to CNS depression, reflecting the inhalational anesthetic effects of hydrocarbons. Inhalational abuse of hydrocarbons can cause simple asphyxiation. Chronic exposure in industrial settings or after long-term inhalational abuse can lead to chronic nervous system effects. Chlorinated hydrocarbons may cause cardiac sensitization to catecholamines, predisposing patients to cardiac dysrhythmias. Halogenated hydrocarbons may also cause hepatotoxicity, nephrotoxicity, and electrolyte disturbances. Hydrocarbons can destroy lipid bilayers and this can lead to "defatting" dermatitis following prolonged skin exposure. Capillary endothelium can be severely damaged in any organ system exposed to hydrocarbon. Hemolysis is rarely reported after hydrocarbon ingestion. Benzene is a bone marrow toxin.

D) EPIDEMIOLOGY: Poisoning is relatively common as these products are widely available in homes and industrial settings. Populations at highest risk include children with unintentional exposure (often ingesting pleasant-smelling oils), workers with occupational exposures, and those who intentionally abuse solvents via inhalation (often referred to as "sniffing" or "huffing"). Toxicity is primarily due to aspiration, but may occur via oral, parenteral, dermal or inhalational routes depending on the substance and nature of exposure.

E) WITH POISONING/EXPOSURE

1) ACUTE EFFECTS OF INGESTION by SIMPLE PETROLEUM DISTILLATES: Low viscosity, highly volatile hydrocarbons (eg, kerosene, gasoline, liquid furniture polish) are chiefly aspiration hazards. Pulmonary damage, transient CNS depression or excitement, and secondary effects of hypoxia, infection, pneumatocele formation, and chronic lung dysfunction can occur. Cardiac complications are rare. These hydrocarbons are poorly absorbed from the gastrointestinal tract and do not cause appreciable systemic toxicity by this route unless aspiration has occurred.

2) ACUTE EFFECTS OF INGESTION by CHLORINATED AND AROMATIC HYDROCARBONS: Many chlorinated, aromatic and other substituted hydrocarbons can produce systemic toxicity following ingestion. CNS, respiratory depression, dysrhythmias, gastrointestinal disturbances, and other effects may occur depending on the agent and amount ingested.

3) ACUTE EFFECTS OF INHALATION: Cardiac dysrhythmias and CNS depression are major concerns of acute exposure. Straight chain hydrocarbons with few carbon atoms (eg, methane, ethane, propane gases) can cause asphyxiation if exposure occurs in poorly ventilated spaces.

a) INHALATIONAL ABUSE ("sniffing") of some hydrocarbons can result in sudden death, encephalopathy, residual neurological impairment, nephrotoxicity, hepatotoxicity, acid-base disturbances, and rhabdomyolysis.

4) INJECTION of kerosene, naphtha, turpentine, gasoline, or hydrocarbon insecticides has resulted in febrile reactions, local tissue inflammation and systemic effects, including pulmonary edema, pneumonia, and mild CNS depression. Severe cases have resulted in multiorgan dysfunction syndrome. Injection of pressurized hydrocarbons has caused severe tissue damage.

5) DERMAL/EYE: Mild to moderate eye irritation and reversible ocular injury may occur after contact with most hydrocarbons. Acute but prolonged exposure to

some hydrocarbons can result in dermal burns and occasionally, systemic effects. Frostbite can result from contact with some liquefied gases (eg, propane, methane, ethane).

6) TYPES OF HYDROCARBONS INCLUDE:
  a) LOW VISCOSITY, UNSUBSTITUTED: Hydrocarbons with low viscosity (less than 100 S.U.S.), low surface tension, and high volatility are most likely to cause aspiration pneumonitis. Vapor inhalation can cause CNS depression or excitation and other effects. Examples: kerosene, mineral seal oil, gasoline, petroleum naphtha.
  b) HIGH VISCOSITY, UNSUBSTITUTED ALIPHATIC: Hydrocarbons with high viscosity and low volatility are less likely to be aspirated after ingestion and are generally poorly absorbed from the gastrointestinal tract. Petroleum jelly may cause a mild laxative effect. Oil mist inhalation may cause lipoid pneumonia. Examples: motor oil, petroleum jelly.
  c) TERPENES: In addition to aspiration, these tend to produce a mild CNS depression after ingestion. Examples: turpentine oil, pine oil. Pine oil cleaners may contain approximately 10% isopropyl alcohol and other additives which may contribute to the observed toxic effects.
  d) AROMATICS: These have a high potential for CNS depression, a mild tendency to cause cardiac irritation, and little risk of aspiration. Adverse effects can result from vapor inhalation, ingestion, or skin exposure. Examples: benzene, xylene. Many polyaromatic hydrocarbons are potential carcinogens.
  e) HALOGENATED-CHLORINATED: These can produce CNS effects, dysrhythmias, renal and hepatic effects. Aspiration is a small risk. Adverse effects can result from vapor inhalation, ingestion, or skin exposure. Examples: chloroform, carbon tetrachloride, trichloroethylene.
  f) NOTE: Brominated hydrocarbons, fluorinated hydrocarbons, alcohols, esters, ethers, chlorinated hydrocarbon pesticides, and other hydrocarbons are covered in other managements.

7) MILD TO MODERATE POISONING: The primary effect seen in mild to moderate inhalational poisoning is euphoria and intoxication followed by CNS depression. This should resolve quickly with removal from the source of inhalational exposure. Patients with oral exposure usually have some gastrointestinal upset and then can develop systemic symptoms as the hydrocarbon is absorbed if a large quantity is ingested. Patients who

have vomiting are at increased risk of aspiration. Aspiration may cause minimal respiratory symptoms (eg, an intermittent cough) initially but progress to severe respiratory injury.

8) SEVERE POISONING: Severe effects may include coma and dysrhythmias. Severe pneumonitis from aspiration may require prolonged intubation. Patients that aspirate will often display a systemic inflammatory response including fever. Chlorinated hydrocarbons can cause ventricular dysrhythmias, and can cause hepatic necrosis that may progress to liver failure. Injection can cause compartment syndrome and necrotizing fasciitis.

9) CHRONIC POISONING: Long-term or repeated exposure to certain aromatic and chlorinated hydrocarbons can result in hematologic (eg, benzene), hepatotoxic (eg, chlorinated hydrocarbons), renal (eg, chlorinated hydrocarbons), neuropsychiatric (eg, toluene), neurological (eg, n-hexane) and carcinogenic (eg, benzene, vinyl chloride) effects. Some effects have occurred primarily in chronic solvent abusers or glue sniffers (eg, neuropsychiatric, renal, and hepatic effects of toluene). Chronic or repeated exposure can result in skin irritation due to defatting of the skin. Greases, coal pitch, and cutting oils can produce acne and folliculitis. Chlorinated aromatic hydrocarbon exposure can result in chloracne.

0.2.5 CARDIOVASCULAR
 0.2.5.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Dysrhythmias may occur following inhalation.

0.2.6 RESPIRATORY
 0.2.6.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Coughing, choking, tachypnea, dyspnea, cyanosis, rales, hemoptysis, pulmonary edema, pneumatoceles, lipoid pneumonia, or respiratory arrest may develop following ingestion and aspiration.
    2) Respiratory arrest can occur secondary to CNS depression following vapor inhalation. Intravenous injection of turpentine immediately resulted in pulmonary edema and hypoxia in 1 case.

0.2.7 NEUROLOGIC
 0.2.7.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Mild central nervous system depression or excitation may occur after ingestion or vapor inhalation. CNS effects can occur secondary to hydrocarbon pneumonitis and hypoxia, or from additives and contaminants

(aniline, heavy metals, camphor, or pesticides). Some hydrocarbons are simple asphyxiants (e.g., methane, ethane, propane gasses) which can produce CNS effects secondary to hypoxia.

0.2.8 GASTROINTESTINAL
 0.2.8.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Nausea, vomiting, diarrhea, and abdominal pain may occur following ingestion.

0.2.9 HEPATIC
 0.2.9.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Elevated transaminases may occasionally occur following ingestion or vapor inhalation of some hydrocarbons. Carbon tetrachloride is a potent hepatotoxin which can produce potentially fatal hepatorenal damage following ingestion, inhalation or dermal exposure.

0.2.10 GENITOURINARY
 0.2.10.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Renal effects (acute renal tubular necrosis, proteinuria, or hematuria) occur infrequently following acute exposure to petroleum distillates and other unsubstituted hydrocarbons.
    2) Some studies have reported an increased risk of glomerulonephritis following long term inhalation and/or dermal exposure to various hydrocarbons. Acute renal failure and other renal effects have been reported in some chronic glue, solvent, or paint sniffers. Exposures in addition to hydrocarbons can not be ruled out in many of these reports.
    3) Many halogenated hydrocarbons are nephrotoxic. Examples of potentially nephrotoxic halogenated hydrocarbons include chloroform, carbon tetrachloride, ethylene dichloride, tetrachloroethane, 1,1,1-trichloroethane, trichloroethylene (infrequently reported) and tetrachloroethylene (weakly nephrotoxic).

0.2.13 HEMATOLOGIC
 0.2.13.1 ACUTE EXPOSURE
   A) WITH POISONING/EXPOSURE
    1) Disseminated intravascular coagulation, hemolytic anemia and pancytopenia have occasionally been reported following vapor inhalation, aspiration, or ingestion of hydrocarbons. Benzene is a bone marrow toxin. Chronic benzene exposure has been associated with acute leukemia.
    2) Contaminants or additives can cause hematologic

abnormalities. Examples include aniline and nitrobenzene (methemoglobinemia).

0.2.15 MUSCULOSKELETAL

0.2.15.1 ACUTE EXPOSURE

A) WITH POISONING/EXPOSURE

1) Subcutaneous injection of paint, lacquer or other material via high pressure spray guns is a surgical emergency. High-pressure injection injuries can result in necrosis and thrombosis with amputation required in 60% to 80% of cases.

2) High pressure injection of paints and solvents can cause significant tissue injury despite a relatively benign initial presentation.

3) Rhabdomyolysis has occasionally been reported in chronic glue or paint sniffers and in a case of prolonged inhalational exposure to mineral spirits. Muscle necrosis, compartment syndrome and/or sterile abscess have been reported following hydrocarbon injection.

0.2.20 REPRODUCTIVE HAZARDS

A) In a prospective study in Toronto, major congenital malformations were noted in 13 of 125 fetuses of mothers exposed to organic solvents during pregnancy. An analysis of data from the ongoing, case-control, National Birth Defects Prevention Study found that for women with occupational exposure to polycyclic aromatic hydrocarbons (PAH) in the month before through 3 months after conception had increased risk for having offspring with a neural tube defect (NTD), particularly spina bifida; however, after adjusting for confounders, the odds ratio for NTDs and spina bifida decreased and lost statistical significance.

Laboratory:

A) Monitor vital signs and mental status.

B) Blood concentrations are not readily available or useful to guide management.

C) Obtain an ECG and institute continuous cardiac monitoring in patients with moderate to severe toxicity or chlorinated hydrocarbon exposure.

D) Obtain CBC, basic chemistry panel, serum creatinine and liver enzymes in severe overdoses or in patients with chronic exposures.

E) Monitor arterial blood gases, pulse oximetry, and pulmonary function tests and obtain chest radiograph in patients with any respiratory symptoms. NOTE: The chest radiograph may be normal early in the clinical course.

F) Standard urine toxicology screen does not detect hydrocarbons.

G) Monitor fluid and electrolyte status in patients with

significant diarrhea and vomiting.
- H) Head CT should be obtained in patients with altered mental status.
- I) Monitor for methemoglobinemia in cyanotic patients who do not respond to supplemental oxygen, and who may have been exposed to hydrocarbons which contain nitrobenzene or aniline.

Treatment Overview:

0.4.2 ORAL EXPOSURE
- A) MANAGEMENT OF MILD TO MODERATE TOXICITY
  - 1) Remove the patient from the source of exposure. When a patient is removed from an inhalational exposure, the symptoms should quickly resolve. Adolescents may present without symptoms after responsible adults find them abusing hydrocarbons via inhalation. Provide oxygen and symptomatic and supportive care. After assuring that the patient is medically stable, remove contaminated clothing and wash exposed skin with soap and water.
- B) MANAGEMENT OF SEVERE TOXICITY
  - 1) Orotracheal intubation for airway protection should be performed early if a patient exhibits respiratory distress. Prophylactic antibiotics and steroids are of no proven benefit in hydrocarbon pneumonitis. Animal studies suggest that artificial surfactant via orotracheal tube may be of benefit. Monitor and treat for dysrhythmias.
- C) DECONTAMINATION
  - 1) PREHOSPITAL: GI decontamination is not recommended because of the risk of aspiration. Remove contaminated clothing and wash exposed skin with soap and water.
  - 2) HOSPITAL: Studies fail to show if gastric emptying improves outcomes in patients with oral hydrocarbon ingestions. However, if a patient has ingested a large amount of a hydrocarbon that causes significant systemic toxicity shortly prior to presentation, it is reasonable to insert a small NG tube and aspirate gastric contents. Activated charcoal should NOT be used; it does not adsorb hydrocarbons well and increases the likelihood of vomiting and aspiration.
- D) AIRWAY MANAGEMENT
  - 1) Perform early in patients with severe intoxication (coma, dysrhythmias, respiratory distress).
- E) ANTIDOTE
  - 1) None.
- F) HYPERTHERMIA
  - 1) Consider antipyretics. Evaluate for secondary pneumonia and other infectious causes.
- G) COMA

  1) Treatment is symptomatic and supportive. Perform orotracheal intubation to protect airway. Assess oxygenation, evaluate for hypoglycemia, and consider naloxone if coingestants are possible.

H) TACHYCARDIA

  1) Tachycardia may occur from a combination of agitation and catecholamine release. Treat with IV fluids and benzodiazepine sedation if agitation is prominent.

I) DYSRHYTHMIAS

  1) Initiate ACLS protocols. Some solvents appear to sensitize the myocardium to catecholamines. Epinephrine and other sympathomimetics should be used with caution as ventricular dysrhythmias may be precipitated.

J) RESPIRATORY DISTRESS

  1) Administer oxygen. Intubate early if patient has respiratory symptoms. Consider the use of a surfactant. Endotracheal instillation of 2 doses of 80 mL/m(2) calfactant (35 mg/mL of phospholipid suspension in saline) in infants, children, and adolescents with acute lung injury resulted in acute improvement in oxygenation and lower mortality in one study.

K) RESPIRATORY FAILURE

  1) Partial liquid ventilation, high frequency jet ventilation, extracorporeal membrane oxygenation (ECMO) and high frequency chest wall oscillation have all been used with apparent success in cases of severe hydrocarbon pneumonitis.

L) ENHANCED ELIMINATION

  1) Hemodialysis and hemoperfusion are not of value.

M) PATIENT DISPOSITION

  1) HOME CRITERIA: Asymptomatic patients with inadvertent exposures may be monitored at home, with particular attention to the development of any respiratory symptoms. Patients who develop symptoms during home monitoring should be referred to a medical facility.

  2) OBSERVATION CRITERIA: Patients with deliberate ingestions and symptomatic patients should be sent to a health care facility for observation for 6 to 8 hours. Although patients can develop a delayed pneumonitis, they are unlikely to do so if they have been completely asymptomatic during that time period.

  3) ADMISSION CRITERIA: Patients with significant persistent central nervous system toxicity (somnolence, delirium), or respiratory symptoms of cough or tachypnea should be admitted. Patients with coma, dysrhythmias, or respiratory distress should be admitted to an intensive care setting.

  4) CONSULT CRITERIA: Consult a poison center or medical toxicologist for assistance in managing patients with

severe toxicity (dysrhythmias, coma or respiratory distress), or in whom the diagnosis is not clear.

N) PITFALLS

1) Failure to aggressively manage the airway can result in death. Patients with minimal respiratory symptoms may progress to severe toxicity over several hours. Patients with altered mentation should be ruled out for intracranial hemorrhage, infection, metabolic disturbance and other toxicologic causes.

O) DIFFERENTIAL DIAGNOSIS

1) Hypoglycemia, central nervous system infection, pulmonary infection, rheumatologic or endocrine etiology, other sedative poisoning (ethanol/benzodiazepine/barbiturate for example), mental illness.

0.4.3 INHALATION EXPOSURE

A) INHALATION: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer oxygen and assist ventilation as required. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids.

0.4.4 EYE EXPOSURE

A) DECONTAMINATION: Irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a health care facility.

0.4.5 DERMAL EXPOSURE

A) OVERVIEW

1) DECONTAMINATION: Remove contaminated clothing and wash exposed area thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists.

2) Some chemicals can produce systemic poisoning by absorption through intact skin. Carefully observe patients with dermal exposure for the development of any systemic signs or symptoms and administer symptomatic treatment as necessary.

Range of Toxicity:

A) TOXICITY: Toxic dose is not established. A single swallow of a hydrocarbon with low viscosity and high volatility can cause pneumonitis if aspirated. Significant systemic toxicity (CNS, renal, hepatic, bone marrow) has been described after exposure to trichloroethane, trichloroethylene, carbon tetrachloride, methylene chloride, and petroleum distillates, or hydrocarbons with toxic additives (eg, pesticides, heavy metals, nitrobenzene, aniline).

B) The following compounds are unlikely to produce systemic symptoms following accidental ingestion: gasoline, kerosene, charcoal lighter fluid, petroleum ether (benzine), petroleum naphtha, VM and P naphtha paint thinner, mineral spirits (eg, Stoddard solvent, white spirit, mineral turpentine, petroleum spirits), turpentine, and aromatic hydrocarbons (xylene, toluene).

C) The following hydrocarbons are not associated with systemic toxicity, but they have the highest risk of severe aspiration pneumonitis: mineral seal oil, signal oil, oils found in furniture polish, or oil polishes.

D) The following generally do not cause CNS or pulmonary problems. They are generally considered nontoxic, although with frank aspiration (very rare) they may cause a low grade lipoid pneumonia: asphalt or tar, lubricants (eg, motor oil, transmission oil, cutting oil, household oil, heavy greases), mineral oil or liquid petrolatum (eg, laxatives, baby oil, suntan oil, white petroleum).

[Rumack BH POISINDEX(R) Information System Micromedex, Inc., Englewood, CO, 2014; CCIS Volume 160, edition expires May, 2014. Hall AH & Rumack BH (Eds): TOMES(R) Information System Micromedex, Inc., Englewood, CO, 2014; CCIS Volume 160, edition expires May, 2014.] **PEER REVIEWED**

Antidote and Emergency Treatment:

Basic treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary ... . Monitor for shock and treat if necessary ... . For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport ... . Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal ... . /Aromatic hydrocarbons and related compounds/
[Bronstein, A.C., P.L. Currance; Emergency Care for Hazardous Materials Exposure. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 181-2] **PEER REVIEWED**

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious or in respiratory arrest. Positive-pressure ventilation techniques with a bag-valve-mask device may be beneficial. Monitor cardiac rhythm and treat arrhythmias if necessary ... . Start an IV with D5W /SRP: "To keep open", minimal flow rate/. Use lactated Ringer's if signs of hypovolemia are present. Watch for signs of fluid overload. Consider drug therapy for pulmonary edema ... . Treat seizures with diazepam (Valium) ... . Use proparacaine hydrochloride to assist eye irrigation ... . /Aromatics hydrocarbons and related compounds/
[Bronstein, A.C., P.L. Currance; Emergency Care for Hazardous Materials Exposure. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 182] **PEER REVIEWED**

Animal Toxicity Studies:

Non-Human Toxicity Excerpts:

IN 6-MO SUBCHRONIC ORAL STUDY, GROUPS OF 15 RABBITS WERE FED ... 0, ... 0.25 & 2.5 MG/KG/DAY. ... HEMOSIDERIN WAS DEPOSITED IN SPLEENS OF HIGH-DOSAGE ANIMALS, INDICATING RED-CELL DESTRUCTION. ... INDIVIDUAL ANIMALS EXHIBITED MILD PROTEIN DYSTROPHY OF LIVER & KIDNEYS.
[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 763] **PEER REVIEWED**

IT PRODUCED 2 DEATHS OF 10 RATS AT 5.0 MG/KG FROM ORAL ADMIN. IN MOUSE IT PRODUCES A LOSS OF RIGHTING RESPONSE AT 10 TO 15 MG/L (2000-3000 PPM), LOSS OF REFLEXES AT 15 MG/L (3000 PPM) & DEATH AT 20 MG/L (4100 PPM) FROM INHALATION. /FROM TABLE/

[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., p. 1348] **PEER REVIEWED**

The effect of hydrophobic organic chemicals on the rate of feeding by mussels (Mytilus edulis) was investigated. The effect was expressed as the toxicant concn in water required to reduce feeding rate by 50% (WEC50). A quantitative structure-activity relationship (QSAR) was derived in which WEC50 was negatively correlated with log 10 octanol-water partition coefficient (log Kow) and positively correlated with aqueous solubility, indicating that hydrophobicity has a major influence on toxicity. Quantitative structure-activity relationships calculated among bioconcentration factor, log Kow, and aqueous solubility showed that hydrophobicity influences toxicity largely through its effect on bioconcentration. This observation was confirmed by expressing toxicity as the toxicant concn in mussel tissue required to reduce feeding rate by 50% (TEC50). For the compounds tested which have log Kow values < 4.6, TEC50 was relatively constant, irrespective of molecular structure. Compounds with log Kow values > 5 could be accumulated to much greater concn before feeding rate was affected, indicating that there is a molecular wt cut-off in the toxicological response. The log Kow for n-propylbenzene was 3.69, the mean bioconcentration factor was 38.0, the WEC50 was 0.86 mg/l (0.69-1.07 mg/l) and the TEC50 was 27.0 mg/kg
[Donkin P et al; Aquat Toxicol 14 (3): 277-94 (1989)] **PEER REVIEWED**

1. Treatment of male rat with the small aromatic hydrocarbons, benzene, toluene, ethylbenzene, n-propylbenzene, m-xylene, and p-xylene increased several P450-dependent activities, with ethylbenzene, m-xylene, and n-propylbenzene producing the greatest response. Hydrocarbon treatment differentially affected toluene metabolism, producing a response dependent on the metabolite monitored. In untreated rats, benzyl alcohol was the major hydroxylation product of toluene metabolism, comprising > 99% of the total metabolites formed. Hydrocarbon treatment increased the overall rate of toluene metabolism by dramatically increasing the amount of aromatic hydroxylation. Ethylbenzene, n-propylbenzene and m-xylene were the most effective inducers of aromatic hydroxylation of toluene. In contrast, production of the major toluene metabolite benzyl alcohol was increased only after treatment with m-xylene. 2. P450 2B1/2B2 levels were induced by each of the hydrocarbons examined, with the magnitude of induction increasing with increasing hydrocarbon size. P450 1A1 was also induced after hydrocarbon exposure; however, the degree of induction was smaller than that observed for P450 2B1/2B2. P450 2C11 levels were suppressed after treatment with benzene, ethylbenzene and n-propylbenzene. 3. Taken together these results display two induction patterns. The first generally corresponds to changes in the P450 2B subfamily, where activities (e.g. the aromatic hydroxylations of toluene) were most effectively induced by ethylbenzene, n-propylbenzene and m-xylene. In the second, induction was observed only after m-xylene treatment, a pattern that was found when the metabolism of the substrate was catalysed by both the P450 2B subfamily and P450 2C11. Hydrocarbons that both induced P450 2B1/2B2 and suppressed P450 2C11 (such as ethylbenzene and n-propylbenzene) showed little change in activities catalysed by both isozymes (e.g. aliphatic hydroxylation of toluene, and aniline hydroxylation); however, m-xylene treatment led to elevated P450 2B1/2B2 levels without significantly suppressing P450 2C11. m-Xylene produced significant increases in activities efficiently catalysed by both isozymes. Therefore, the unique induction pattern observed after m-xylene treatment can be accounted for by induction of P450 2B1/2B2 without concomitant suppression of P450 2C11.
[Backes WL et al; Xenobiotica 23 (12): 1353-66 (1993)] **PEER REVIEWED** PubMed Abstract

Non-Human Toxicity Values:
LD50 Rat oral 6040 mg/kg
[Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 1348] **PEER REVIEWED**

Ecotoxicity Values:
WEC50 Mytilus edulis (mussels) 0.86 mg/l (0.69-1.07 mg/l) (toxicant concn in water required to reduce feeding rate by 50%).
[Donkin P et al; Aquat Toxicol 14 (3): 277-94 (1989)] **PEER REVIEWED**

TEC50 Mytilus edulis (mussels) 27.0 mg/kg (22.7-32.1 mg/kg) (toxicant conc in mussel tissue required to reduce feeding rate by 50%).
[Donkin P et al; Aquat Toxicol 14 (3): 277-94 (1989)] **PEER REVIEWED**

Metabolism/Pharmacokinetics:

Metabolism/Metabolites:
IN RATS, THERE APPEARS TO BE A DUAL METABOLIC PATHWAY: SIDE-CHAIN OXIDATION & RING HYDROXYLATION, WITH FORMER PREFERRED.

[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

Absorption, Distribution & Excretion:
... PROBABLY READILY ABSORBED FROM GI TRACT & LUNG & EXCRETED MAINLY IN URINE OF HUMANS.
[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

Pharmacology:

Environmental Fate & Exposure:

Environmental Fate/Exposure Summary:
n-Propylbenzene occurs naturally in petroleum and bituminous coal. It's production and use as a solvent and in textile dyeing and printing may result in its release to the environment through various waste streams. If released to air, a vapor pressure of 3.42 mm Hg at 25 deg C indicates n-propylbenzene will exist solely as a vapor in the ambient atmosphere. Vapor-phase n-propylbenzene will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 2 days. If released to soil, n-propylbenzene is expected to have low mobility based upon Koc values of 676 and 725 and an estimated value of 955. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 1.05X10-2 atm-cu m/mole. n-Propylbenzene may volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation in soil may occur based upon results of activated sludge studies, theoretical BODs ranging from 21.8 to 43.7%. If released into water, n-propylbenzene is not expected to adsorb to suspended solids and sediment in water based upon the Koc. Biodegradation from water may occur based on activated sludge studies. Volatilization from water surfaces is expected to be an important fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 1 hr and 4 days, respectively. An estimated BCF of 138 suggests the potential for bioconcentration in aquatic organisms is high. Hydrolysis is not expected to occur due to the lack of hydrolyzable functional groups. Occupational exposure to n-propylbenzene may occur through inhalation and dermal contact with this compound at workplaces where n-propylbenzene is produced or used. The general population is continually exposed to n-propylbenzene through inhalation since it has been frequently detected in the atmosphere. (SRC)
PEER REVIEWED

Probable Routes of Human Exposure:
Occupational exposure to n-propylbenzene occurs through dermal contact and inhalation of vapor(1); absorption takes place by inhalation and in small quantities through intact skin(1).
[(1) Parmeggiani L; Encyl Occup Health & Safety 3rd ed Geneva, Switzerland: International Labour Office p. 1074-5 (1983)] **PEER REVIEWED**

NIOSH (NOHS Survey 1972-1974) has statistically estimated that 16,823 workers are potentially exposed to n-propylbenzene in the USA(1). Mean air levels of 0.1-0.2 ppm n-propylbenzene were detected inside two US factories involved in spray painting and glueing(2). Air samples collected inside a tire re-treading factory in Italy contained n-propylbenzene levels of 0-15 ug/cu m(2); a shoe sole factory (vulcanization area) had a level of 30-300 ug/cu m(2). Occupational exposure to n-propylbenzene may occur through inhalation and dermal contact with this compound at workplaces where n-propylbenzene is produced or used. The general population is continually exposed to n-propylbenzene through inhalation since it has been detected frequently in the atmosphere(SRC).
[(1) NIOSH; National Occupational Hazard Survey (NOHS) (1974) (2) Whitehead LW et al; Amer Ind Hyg Assoc J 45: 767-772 (1984) (3) Cocheo V et al; Amer Ind Hyg Assoc J 44: 521-7 (1983)] **PEER REVIEWED**

Body Burden:
n-Propylbenzene was qualitatively detected in 8 of 46 samples of human adipose tissue analyzed during the EPA National Human Adipose Tissue Survey in fiscal year 1982(1).
[(1) Onstat JD et al; Characterization of HRGC/MS Unidentified Peaks from the Broad Scan Analysis of the FY82 NHATS Composites. Vol I. EPA Contract No. 68-02-4252. Washington, DC: USEPA (1987)] **PEER REVIEWED**

Average Daily Intake:

AIR: Assuming an avg n-propylbenzene concn of 0.605-0.822 ug/cu m in urban-suburban outdoor air(1) and an inhalation rate of 20 cu m/day, the AVDI is 12.1-16.44 ug/day(SRC).

[(1) Shah JJ, Heyerdahl EK; National Ambient Volatile Organic Compounds (VOCs) Database Update. USEPA/600/3-88-010(a) Research Triangle Park, NC: USEPA p. 53 (1988)] **PEER REVIEWED**

Natural Pollution Sources:

n-Propylbenzene occurs as a natural constituent in petroleum(1,3) and bituminous coal(2).

[(1) Abrams EF et al; Identification of Organic Compounds in Effluents from Industrial Sources USEPA-560/3-75-002 p. 134 (1975) (2) Schobert HH; The Chemistry of Hydrocarbon Fuels London: Butterworths & Co Ltd p. 50 (1990) (3) Verschueren K; Handbook of Environmental Data on Organic Chemicals. 3rd ed. NY, NY: Van Nostrand Reinhold Co. p. 1586 (1996)] **PEER REVIEWED**

Artificial Pollution Sources:

Incineration of organic, petroleum or coal wastes, and combustion of fuels will release n-propylbenzene to the atmosphere(1). General uses of asphalt and naphtha and use as a solvent will release n-propylbenzene to the environment(1). n-Propylbenzene is emitted in the exhaust from gasoline and diesel engines(2). Outboard motors and motor boats have been identified as sources of n-propylbenzene emissions to water(3,4). n-Propylbenzene can be released to the environment in leachates and vapor emissions from landfills(5,6).

[(1) Abrams EF et al; Identification of Organic Compounds in Effluents from Industrial Sources USEPA-560/3-75-002 p. 134 (1975) (2) Hampton CV et al; Environ Sci Technol 17: 699-708 (1983) (3) Juttner F; Z Wasser-Abwasser-Forsch 21: 36-9 (1988) (4) Montz WE Jr et al; Arch Environ Contam Toxicol 11: 561-5 (1982) (5) Foerst C et al; Intern J Environ Chem 37: 287-93 (1989) (6) Young P, Parker A; ASTM Spec Tech Publ 851 (Hazard Ind Waste Manage Test): 24-41 (1984)] **PEER REVIEWED**

n-Propylbenzene's production and use as a solvent and use in textile dyeing(1) may result in its release to the environment through various waste streams(SRC).

[(1) Budavari S, ed; The Merck Index 12th ed. Whitehouse Station, NJ: Merck and Co., Inc. p. 1348 (1996)] **PEER REVIEWED**

Environmental Fate:

TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 955(SRC), determined from molecular connectivity indices(2), and measured values of 495 to 725(3,4) indicates that n-propylbenzene is expected to have low mobility in soil(SRC). Volatilization of n-propylbenzene from moist soil surfaces is expected to be an important fate process(7) given a Henry's Law constant of 1.05X10-2 atm-cu m/mole(5). The potential for volatilization of n-propylbenzene from dry soil surfaces may exist(SRC) based upon a vapor pressure of 3.42 mm Hg(6). Biodegradation from soil may occur based on results from activated sludge studies(8).

[(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992) (3) Vowles PD, Mantoura RFC; Chemosphere 16: 109-16 (1987) (4) Szabo G et al; Chemosphere 21: 729-39 (1990) (5) Sanemasa I et al; Bull Chem Soc Japan 55: 1054-62 (1982) (6) Daubert TE, Danner RP; Physical and thermodynamic properties of pure chemicals: data compilation. Design Inst Phys Prop Data, Amer Inst Chem Eng. NY, NY: Hemisphere Pub. Corp 4 Vol (1989) (7) Lyman WJ et al; Handbook of Chemical Property Estimation Methods Washington, DC: Amer Chem Soc p. 4-9 (1990) (8) Malaney GW; J Water Pollut Control Fed 32: 1300-11 (1960)] **PEER REVIEWED**

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 955(SRC), determined from molecular connectivity indices(2), as well as measured Koc values ranging from 495 to 725(3,4), indicate that n-propylbenzene is not expected to adsorb to suspended solids and sediment(SRC). Volatilization from water surfaces is expected(5) based upon a Henry's Law constant of 1.05X01-2 atm-cu m/mole(6). Using this Henry's Law constant and an estimation method(5), volatilization half-lives for a model river and model lake are 1 hr and 4 days, respectively(SRC). Volatilization half-lives of 1.3 to 19 days have been predicted for the Narraganset Bay near RI where volatilization is expected to be the major removal process(10). Aquatic hydrolysis is not an important fate process(SRC) due to the lack of hydrolyzable functional groups(5). According to a classification scheme(7), an estimated BCF of 138(SRC), from its log Kow of 3.69(8) and a regression-derived equation(9), suggests the potential for bioconcentration in aquatic organisms is moderate. Biodegradation from water may occur based on activated sludge studies, with theoretical BODs ranging from 21.8 to 43.7%(11,12).

[(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992) (3) Vowles PD, Mantoura RFC; Chemosphere 16: 109-16 (1987) (4) Szabo G et al; Chemosphere 21: 729-39 (1990) (5) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 4-9, 7-4 to 7-5, 15-1 to 15-29 (1990) (6) Sanemasa I et al; Bull Chem Soc Japan 55: 1054-62 (1982) (7) Franke C et al; Chemosphere 29: 1501-14 (1994) (8) Sangster J; LOGKOW Databank. Sangster Res. Lab., Montreal Quebec, Canada (1994) (9) Meylan WM et al; Environ Toxicol Chem 18: 664-72 (1999) (10) Wakeham SG et al; Environ Sci Technol 17: 611-7 (1983) (11) Malaney GW; J Water Pollut Control Fed 32: 1300-11 (1960) (12) Marion CV, Malaney GW; pp. 297-308 in Proc 18th Ind Waste Conf, Eng Bull Purdue Univ, Eng Ext Ser (1964)] **PEER REVIEWED**

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), n-propylbenzene, which has a vapor pressure of 3.42 mm Hg at 25 deg C(2), is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase n-propylbenzene is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 2 days(SRC), calculated from its rate constant of 5.0X10-12 cu cm/molecule-sec at 25 deg C(3). The detection of n-propylbenzene in rainwater samples(4) suggests that physical removal from the atmosphere by wet deposition is possible(SRC).
[(1) Bidleman TF; Environ Sci Technol 22: 361-367 (1988) (2) Daubert TE, Danner RP; Physical and thermodynamic properties of pure chemicals: data compilation. Design Inst Phys Prop Data, Amer Inst Chem Eng. NY, NY: Hemisphere Pub. Corp 4 Vol (1989) (3) Atkinson R; J Chem Phys Ref Data Monograph No. 2 p. 48 (1994) (4) Kawamura K, Kaplan IR; Environ Sci Technol 17: 497-501 (1983)] **PEER REVIEWED**

Environmental Biodegradation:

A batch system die-away test using artificial seawater, a 10-day incubation period, and an inoculum of coastal water from the North Sea found n-propylbenzene to undergo fast bio-oxidation (actual rates not reported)(1). Theoretical BODs of 21.8-43.7% were measured using 3 different activated sludges in Warburg respirometers and 7.5 days of incubation(2). n-Propylbenzene was readily oxidized (8-day theoretical BOD of 34.4%) in Warburg respirometer studies using an activated sludge that had been acclimated to aniline(3). n-Propylbenzene was readily oxidized (1-day and 8-day theoretical BODs of 8.4 and 27.8%, respectively) in Warburg respirometer studies using an activated sludge that had been acclimated to benzene(3). A 5-day theoretical BOD of 25.5% was observed in a mixed microbial culture degradation study(4). A 5-day theoretical BOD of 2.3-2.5% (standard dilution technique) and a 6-hr theoretical BOD of 0.8% (Warburg respirometer) were measured for n-propylbenzene, however, the initial concns of n-propylbenzene may have been sufficiently high to be toxic to the microbial populations(5).
[(1) Van Der Linden AC; Dev Biodegrad Hydrocarbons 1: 165-200 (1978) (2) Marion CV, Malaney GW; pp. 297-308 in Proc 18th Ind Waste Conf, Eng Bull Purdue Univ, Eng Ext Ser (1964) (3) Malaney GW; J Water Pollut Control Fed 32: 1300-11 (1960) (4) Babeu L, Vaishnav DD; J Indus Microbiol 2: 107-15 (1987) (5) Bogan RH, Sawyer CN; Sewage Indust Wastes 27: 917-28 (1955)] **PEER REVIEWED**

ANAEROBIC: n-Propylbenzene was not metabolized over a 14 day period in a laboratory aquifer column operated under continuous flow conditions at 30 deg C and with an m-xylene adapted inoculum(1). A series of wells were sampled below the water table down gradient from an oil lens resulting from a pipe line break in Bemidji, MN(2). The concn of n-propylbenzene (50 ppbC) did not show any appreciable loss within 65 m of the oil lens. Only after the groundwater is reoxygenated downgradient did n-propylbenzene show significant degradation(2).
[(1) Kuhn EP et al; Appl Environ Microbiol 54: 490-6 (1988) (2) Cozzarelli IM et al; Environ Geol Water Sci 16: 135-41 (1990)] **PEER REVIEWED**

Environmental Abiotic Degradation:

The rate constant for the vapor-phase reaction of n-propylbenzene with photochemically-produced hydroxyl radicals is 6.0X10-12 cu cm/molecule-sec at 25 deg C(1). This corresponds to an atmospheric half-life of about 2 days at an atmospheric concentration of 5X10+5 hydroxyl radicals per cu cm(2). Aquatic hydrolysis is not an important fate process(SRC) due to the lack of hydrolyzable functional groups(3). n-Propylbenzene did not directly photolyze in experiments using pure aqueous seawater solutions and simulated sunlight(4); however, addition of an anthraquinone photosensitizer resulted in n-propylbenzene degradation and a formation of 1-phenyl-1-propanone, 1-phenyl-1-propanol, and benzaldehyde(4).
[(1) Atkinson R; J Chem Phys Ref Data Monograph No. 2 p. 48 (1994) (2) Meylan WM, Howard PH; Chemosphere 26: 2293-99 (1993) (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5 (1990) (4) Ehrhardt M, Petrick G; Mar Chem 15: 47-59 (1984)] **PEER REVIEWED**

Environmental Bioconcentration:

An estimated BCF of 138 was calculated for n-propylbenzene(SRC), using a log Kow of 3.69(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is high.
[(1) Sangster J; LOGKOW Databank. Sangster Res. Lab., Montreal Quebec, Canada (1994) (2) Meylan WM et al; Environ Toxicol Chem 18: 664-72 (1999) (3) Franke C et al; Chemosphere 29: 1501-14 (1994)] **PEER REVIEWED**

Soil Adsorption/Mobility:
A Koc of 725 was measured for n-propylbenzene using a surface sediment collected from the Tamar estuary(1). A similar Koc of 676 was measured in a humic acid column via HPLC(2). Adsorption percentages ranging from 0.16 to 5.58% were measured in soil column studies using three different soil types and a sludge sample(3). Using a structure estimation method based on molecular connectivity indices(4), the Koc for n-propylbenzene can be estimated to be 955(SRC). According to a classification scheme(5), these estimated and measured Koc values suggest that n-propylbenzene is expected to have low mobility in soil.
[(1) Vowles PD, Mantoura RFC; Chemosphere 16: 109-16 (1987) (2) Szabo G et al; Chemosphere 21: 729-39 (1990) (3) Kanatharana P, Grob RL; J Environ Sci Health A18: 59-77 (1983) (4) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992) (5) Swann RL et al; Res Rev 85: 17-28 (1983)] **PEER REVIEWED**

Volatilization from Water/Soil:
The Henry's Law constant for n-propylbenzene is 1.05X10-2 atm-cu m/mole(1). This Henry's Law constant indicates that n-propylbenzene is expected to volatilize rapidly from water surfaces(2). Based on this Henry's Law constant, the volatilization half-life from a model river (1 m deep, flowing 1 m/sec, wind velocity of 3 m/sec)(2) is estimated as 1 hour(SRC). The volatilization half-life from a model lake (1 m deep, flowing 0.05 m/sec, wind velocity of 0.5 m/sec)(2) is estimated as 4 days(SRC). Results of mesocosm studies simulating the Narragansett Bay indicate that volatilization is the major removal process from seawater(3); volatilization half-lives of 1.3-19 days were estimated for summer, spring and winter seasons(5). n-Propylbenzene's Henry's Law constant(1) indicates that volatilization from moist soil surfaces may occur(SRC). The potential for volatilization of n-propylbenzene from dry soil surfaces may exist(SRC) based upon it's vapor pressure of 3.42 mm Hg(4).
[(1) Sanemasa I et al; Bull Chem Soc Japan 55: 1054-62 (1982) (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (3) Wakeham SG et al; Environ Sci Technol 17: 611-7 (1983) (4) Daubert TE, Danner RP; Physical and thermodynamic properties of pure chemicals: data compilation. Design Inst Phys Prop Data, Amer Inst Chem Eng. NY, NY: Hemisphere Pub. Corp 4 Vol (1989)] **PEER REVIEWED**

Environmental Water Concentrations:
DRINKING WATER: Results of the USEPA Groundwater Supply Survey (finished water supplies that use groundwater sources) found that n-propylbenzene was detected in only one of 945 sources (concn of 0.98 ug/l in the one source) that were surveyed from throughout the US(1). Drinking water samples collected from Miami, FL and Cincinnati, OH during 1974 and 1975 had respective n-propylbenzene concns of 0.05 and 0.01 ug/l(2). A drinking water sample from Cincinnati, OH in Feb 1980 had a n-propylbenzene concn of 33 ng/l(3).
[(1) Westrick JJ et al; J Amer Water Works Assoc 76: 52-9 (1984) (2) USEPA; Preliminary Assessment of Suspected Carcinogens in Drinking Water. Interim Report to Congress. Washington, DC (1975) (3) Coleman EW et al; Arch Environ Contam Toxicol 13: 171-8 (1984)] **PEER REVIEWED**

SURFACE WATER: The n-propylbenzene concn in Lake Constance varied from 4 to 132 ng/l; concns were observed to increase with increasing boat traffic(1). n-Propylbenzene was detected at levels up to 6 ug/l in river waters and their estuaries in Osaka City, Japan(2). During a 1992-1993 study, n-propylbenzene was not detected in surface water from a wetland in Orange County, FL which is adjacent to a landfill; it was detected in the 1989-1990 study at a concn of 0.08 ug/l(3).
[(1) Juttner F; Z Wasser-Abwasser-Forsch 21: 36-9 (1988) (2) Yamamoto K et al; Environ Pollut 95: 135-43 (1977) (3) Chen CS, Zoltek J Jr; Chemosphere 31: 3455-64 (1995)] **PEER REVIEWED**

GROUNDWATER: A well water sample collected near a landfill in Delaware had an n-propylbenzene concn of 0.5 ug/l(1). During a 1992-1993 study, n-propylbenzene was measured in ground water from a wetland in Orange County, FL which is adjacent to a landfill, ranging from not detected to 0.65 ug/l; it was detected in the 1989-1990 study (not detected to 0.08 ug/l)(3).
[(1) DeWalle FB, Chian ESK; J Amer Water Works Assoc 73: 206-11 (1981) (2) Chen CS, Zoltek J Jr; Chemosphere 31: 3455-64 (1995)] **PEER REVIEWED**

RAIN/SNOW: Trace levels (concn not reported) of n-propylbenzene were detected in rainwater collected in Los Angeles, CA on Mar 26, 1982(1).
[(1) Kawamura K, Kaplan IR; Environ Sci Technol 17: 497-501 (1983)] **PEER REVIEWED**

Effluent Concentrations:
n-Propylbenzene has been qualitatively detected in various wastewaters from the following industries: petroleum refining, textile mills, auto and other laundries, plastics mfg, and publicly owned treatment works(1). Leachate from 4 hazardous waste landfills in Germany contained n-propylbenzene levels of 10-700 ug/l(3). An n-

propylbenzene concn of 69 mg/cu m was detected in gas emissions from a landfill in Great Britain(4). An aqueous effluent from a US petroleum refinery had a n-propylbenzene concn of 13 ng/g(5). n-Propylbenzene is a component of leachate from a landfill in Germany, being detected up to a distance of 56 m(5). Maximum concns of n-propylbenzene in the off-gas at aerated grit chambers in two Ontario, Canada municipal wastewater treatment plants were 205 and 203 ug/l(6).
[(1) Bursey JT, Pellizzari ED; Analysis of Industrial Wastewater for Organic Pollutants in Consent Decree Survey. Contract No. 68-03-2867. Athens, GA: USEPA Environ Res Lab p. 79, 90 (1982) (2) Foerst C et al; Intern J Environ Chem 37: 287-93 (1989) (3) Young P, Parker A; ASTM Spec Tech Publ 851(Hazard Ind Waste Manage Test): 24-41 (1984) (4) Snider EH, Manning FS; Environ Intern 7: 237-58 (1982) (5) Fresnius W et al; in Amer Chem Soc, Div Environ Chem, Preprint Ext Abst, 208th ACS Nat Mtg, 34: 596-9 (1994) (6) Bell J et al; Water Environ Res 65: 708-16 (1993)] **PEER REVIEWED**

Based upon dynamometer tests, the avg n-propylbenzene emission rate from gasoline-powered engines is 1.2 mg/km(1). Emission rates for n-propylbenzene from motor vehicles was calculated to be 34 mg/l of fuel consumed based on measurements made inside and outside a Los Angeles roadway tunnel(2). It is also a component of exhaust emissions from four-stroke lawn mower engines: n-propylbenzene comprised 0.57% of total organic emissions from baseline gasoline and 0.55% of total organic emissions in reformulated gasoline(3). Four stroke outboard motors are also a source of n-propylbenzene into surface waters(4).
[(1) Hampton CV et al; Environ Sci Technol 17: 699-708 (1983) (2) Fraser MP et al; Environ Sci Technol 32: 2051-60 (1998) (3) Gabele P; J Air Waste Manage Assoc 47: 945-523 (1997) (4) Juttner F; Chemosphere 29: 191-200 (1994)] **PEER REVIEWED**

n-Propylbenzene has also been detected as a possible volatile (C3-benzene) from furniture coatings for wood-based materials(1) and as a volatile emission from building materials (concn): linoleum tile (2.3 ug-sq m/hr); black rubber molding (0.96 ug-sq m/hr); vinyl edge molding (0.34 ug-sq m/hr); large diameter telephone cable (0.65 ug-sq m/hr); small diameter telephone cable (0.79 ug-sq m/hr); polystyrene foam insulation (0.70 ug-sq m/hr); cove adhesive (110 ug-sq m/hr); latex caulk (2.7 ug-sq m/hr); carpet (0.49 ug-sq m/hr)(2).
[(1) Salthammer T; Indoor Air 7: 189-7 (1997) (2) Sheldon LS et al; in Proc APCA Annual Mtg, 79th. 4: 86/52.3 (1986)] **PEER REVIEWED**

Sediment/Soil Concentrations:
n-Propylbenzene was not detected (detection limit 5-23 ppb) in sediments collected from the Duwamish River Delta (Puget Sound, WA)(1).
[(1) Varanasi U et al; Environ Sci Technol 19: 836-41 (1985)] **PEER REVIEWED**

Atmospheric Concentrations:
SOURCE DOMINATED: n-Propylbenzene was detected in tunnel air at 0.037 g/kg (traffic) and 0.052 (congested) from the Craeybeckx highway tunnel in Antwerp Belgium(1).
[(1) DeFre R et al; Environ Health Perspect 4: 31-7 (1994)] **PEER REVIEWED**

URBAN/SUBURBAN: An evaluated database of US air monitoring data for the years 1970-1987 contains the following data for n-propylbenzene (concn is reported as daily median conc): suburban sites-213 samples, 0.123 ppb; urban sites-520 samples, 0.167 ppb(1). Air samples collected in Tulsa, OK in Jul 1978 contained n-propylbenzene levels of 0-0.9 ppb(2); samples from Rio Blanco County, CO (Jul 1978) had levels of 0.5-1.6 ppb (2). Ambient air samples collected in Long Beach, Burbank, Azuza, Los Angeles and Inglewood, CA (date no reported) contained n-propylbenzene levels of 0.001-0.011 ppm(3). The avg concn in the ambient air of Sydney, Australia between Sep 1979 and June 1980 (140 samples) was 0.4 ppb(4). The n-propylbenzene concn in Los Angeles, CA air range from 1-3 ppb during Sep-Nov 1981 monitoring(5).
[(1) Shah JJ, Heyerdahl EK; National Ambient Volatile Organic Compounds (VOCs) Database Update USEPA/600/3-88-010(a) Research Triangle Park, NC: USEPA p. 53 (1988) (2) Arnts RR, Meeks SA; Atmos Environ 15: 1643-51 (1981) (3) Neligan RE et al; The Gas Chromatographic Determination of Aromatic Hydrocarbons in the Atmosphere ACS Natl Mtg p. 118-21 (1965) (4) Nelson PF, Quigley SM; Environ Sci Technol 16: 650-5 (1982) (5) Grosjean D, Fung K; J Air Pollut Control Assoc 34: 537-43 (1984)] **PEER REVIEWED**

URBAN/SUBURBAN: The avg concns of n-propylbenzene in the air of Vienna, Austria during Oct 1986 to Feb 1987 monitoring were 0.6 ppb (background), 2.2 ppb (suburbs), and 4.8 ppb (streets)(1). An avg n-propylbenzene concn of 2 ppb was monitored in Los Angeles, CA air during the fall of 1966(2). Levels ranging from 0.2-61.1 ppb were detected in the ambient air of Houston, TX during 1973 and 1974 monitoring(3). Air samples from Atlanta, GA contained n-propylbenzene at a concn of <5 ppbC(4).
[(1) Lanzerstorfer C, Puxbaum H; Water, Air, and Soil Pollut 51: 345-55 (1990) (2) Lonneman WA et al; Environ Sci Technol 2: 1017-20 (1968) (3) Lonneman WA et al; Hydrocarbons in Houston Air. USEPA-600/3-79-018 Research Triangle Park, NC: USEPA (1979) (4) Bernardo-Bricker A et al; J Air

Waste Manag Assoc 45: 591-603 (1995)] **PEER REVIEWED**

RURAL/REMOTE: An evaluated database of US air monitoring data for the years 1970-1987 contained the following data for n-propylbenzene (conc is reported as daily median conc): remote sites-2 samples, 0.056 ppb; rural sites-2 samples, 0.056 ppb(1). Samples from the Smokey Mountains (Sept 1978) had levels of 0-0.6 ppb(2).
[(1) Shah JJ, Heyerdahl EK; National Ambient Volatile Organic Compounds (VOCs) Database Update USEPA/600/3-88-010(a) Research Triangle Park, NC: USEPA p. 53 (1988) (2) Arnts RR, Meeks SA; Atmos Environ 15: 1643-51 (1981)] **PEER REVIEWED**

INDOOR AIR: n-Propylbenzene was detected in 85% of the indoor air of 26 houses in Helsinki, Finland(1). The median concn in a normal house was 0.62 ug/cu m(1). In "sick houses", 10.5% contained n-propylbenzene at 5-10% greater than average; 2.6% houses contained 10-50% greater than average, and 2.6% houses contained 200-1000% greater than average concn of n-propylbenzene(1).
[(1) Kostiainen R; Atmos Environ 29: 693-702 (1995)] **PEER REVIEWED**

Food Survey Values:
n-Propylbenzene has been qualitatively identified as a volatile constituent of chickpea flour(1), roasted filbert nuts (2) and scrambled eggs(3). Level in peanut oil was less than 2% of the total volatiles(4).
[(1) Rembold H et al; J Agric Food Chem 37: 659-62 (1989) (2) Kinlin TE et al; J Agric Food Chem 20: 1021 (1972) (3) Matiella JE, Hsieh TCY; J Food Sci 56: 387-90, 426 (1991) (4) Chung TY et al; J Agric Food Chem 41: 1467-70 (1993)] **PEER REVIEWED**

Other Environmental Concentrations:
n-Propylbenzene has been qualitatively detected in latex paint(1).
[(1) Tichenor BA, Mason MA; JAPCA 38: 264-8 (1988)] **PEER REVIEWED** PubMed Abstract

Environmental Standards & Regulations:

State Drinking Water Guidelines:
(CA) CALIFORNIA 260 ug/l
[USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present] **QC REVIEWED**

(FL) FLORIDA 280 ug/l
[USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present] **QC REVIEWED**

(NH) NEW HAMPSHIRE 260 ug/L
[USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present] **QC REVIEWED**

Chemical/Physical Properties:

Molecular Formula:
C9-H12
PEER REVIEWED

Molecular Weight:
120.19
[Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 1348] **PEER REVIEWED**

Color/Form:
Colorless liquid
[Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 933] **PEER REVIEWED**

Liquid
[Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 1348] **PEER REVIEWED**

Boiling Point:
159.2 deg C
[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 79th ed. Boca Raton, FL: CRC Press Inc., 1998-1999., p. 3-60] **PEER REVIEWED**

Melting Point:
-99.5 deg C
[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 79th ed. Boca Raton, FL: CRC Press Inc., 1998-1999., p. 3-60] **PEER REVIEWED**

Density/Specific Gravity:
Specific gravity: 0.8620 @ 20 deg C/4 deg C
[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 79th ed. Boca Raton, FL: CRC Press Inc., 1998-1999., p. 3-60] **PEER REVIEWED**

Octanol/Water Partition Coefficient:
log Kow= 3.69
[Sangster J; LOGKOW Databank. Sangster Res. Lab., Montreal Quebec, Canada (1994)] **PEER REVIEWED**

Solubilities:
Very slightly sol in water (0.06 g/l); sol in alcohol, ether
[Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 1348] **PEER REVIEWED**

Miscible in ethanol, ethyl ether, and acetone
[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 79th ed. Boca Raton, FL: CRC Press Inc., 1998-1999., p. 3-60] **PEER REVIEWED**

Water solubility of 23.4 mg/l at 25 deg C.
[Tewari YB et al; J Chem Eng Data 27: 451-4 (1982)] **PEER REVIEWED**

Spectral Properties:
Index of refraction: 1.4920 @ 20 deg C/D
[Lide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 79th ed. Boca Raton, FL: CRC Press Inc., 1998-1999., p. 3-60] **PEER REVIEWED**

SADTLER REFERENCE NUMBER 5654 (IR, PRISM); MAX ABSORPTION (ISOOCTANE): 249 NM (LOG E= 2.07), 261.5 NM (LOG E= 2.31), 264.5 NM (LOG E= 2.19), 268 NM (LOG E= 2.20)
[Weast, R.C. (ed.) Handbook of Chemistry and Physics. 69th ed. Boca Raton, FL: CRC Press Inc., 1988-1989., p. C-117] **PEER REVIEWED**

IR: 3582 (Coblentz Society Spectral Collection)
[Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985., p. V1 182] **PEER REVIEWED**

UV: 21908 (Sadtler Research Laboratories Spectral Collection)
[Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985., p. V1 182] **PEER REVIEWED**

NMR: 17088 (Sadtler Research Laboratories Spectral Collection)
[Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985., p. V1 182] **PEER REVIEWED**

MASS: 483 (Atlas of Mass Spectral Data, John Wiley & Sons, New York)
[Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca

Raton, FL: CRC Press Inc. 1985., p. V1 182] **PEER REVIEWED**

Vapor Density:
4.14 (Air= 1)
[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., p. 1304-1305] **PEER REVIEWED**

Vapor Pressure:
3.42 mm Hg @ 25 deg C
[Daubert, T.E., R.P. Danner. Physical and Thermodynamic Properties of Pure Chemicals Data Compilation. Washington, D.C.: Taylor and Francis, 1989.] **PEER REVIEWED**

Other Chemical/Physical Properties:
Partition coefficients at 37 deg C for N-propylbenzene into blood= 47.0; into oil= 9,780.
[Sato A, Nakajima T; Scand J Work Environ Health 13: 81-93 (1987)] **PEER REVIEWED** PubMed Abstract

Henry's Law constant= 1.05X10-2 atm-cu m/mol @ 25 deg C
[Sanemasa I et al; Bull Chem Soc Japan 55: 1054-62 (1982)] **PEER REVIEWED**

Hydroxyl radical rate constant= 6.1X10-12 cu cm/molecule-sec @ 25 deg C
[Atkinson R; J Phys Chem Ref Data Mongraph No. 2 p. 48 (1994)] **PEER REVIEWED**

Chemical Safety & Handling:

Hazards Summary:
The major hazards encountered in the use and handling of n-propylbenzene stem from its toxicologic properties and flammability. Toxic by all routes (ie, inhalation, ingestion, dermal contact), exposure to this colorless liquid may occur from its use in textile dyeing and printing, as a solvent for cellulose acetate, and in the manufacture of methylstyrene. Effects from exposure may include burns to the skin and eyes, nausea, headache, dizziness, central nervous system depression, and unconsciousness. In activities and situations where over-exposure may occur, wear a positive pressure self-contained breathing apparatus and protective clothing. If contact should occur, immediately irrigate exposed eyes with copious amounts of tepid water for at least 15 minutes, and wash exposed skin thoroughly with soap and water. Contaminated clothing should be removed and left at the site. This substance is flammable and may be ignited by heat, sparks, or flames. Its heavier-than-air vapor may travel to a source of ignition and flash back, or accumulate to explosive concentrations in enclosed spaces, such as sewers. Also, containers of n-propylbenzene may explode in the heat of a fire. For fires involving this substance, extinguish with dry chemical, CO2, water spray, fog, or alcohol-resistant foam. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in the fire. For small spills of n-propylbenzene, take up with sand or other noncombustible absorbent, and place into container for later disposal. Dike far ahead of large spills to contain for later disposal.
PEER REVIEWED

DOT Emergency Guidelines:
/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Fire or Explosion: HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. Substances may be transported hot.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Health: Inhalation or contact with material may irritate or burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident.

Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Public Safety: CALL Emergency Response Telephone Number ... . As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Protective Clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Evacuation: Large spill: Consider initial downwind evacuation for at least 300 meters (1000 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Fire: Caution: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient. CAUTION: For mixture containing a high percentage of an alcohol or polar solvent, alcohol-resistant foam may be more effective. Small fires: Dry chemical, CO2, water spray or regular foam. Large fires: Water spray, fog or regular foam. Use water spray or fog; do not use straight streams. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ Spill or Leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

/GUIDE 128: FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE)/ First Aid: Move victim to fresh air. Call 911 or emergency medical service. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
[U.S. Department of Transportation. 2004 Emergency Response Guidebook. A Guide book for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident. Washington, D.C. 2004] **QC REVIEWED**

Skin, Eye and Respiratory Irritations:
... IRRITATING TO MUCOUS MEMBRANES, EYES, NOSE, THROAT & SKIN.
[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

Fire Potential:

Flammable, moderate fire risk.
[Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 12th ed. New York, NY: Van Nostrand Rheinhold Co., 1993, p. 970] **PEER REVIEWED**

A very dangerous fire hazard when exposed to heat, flame, or oxidizers ...
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

NFPA Hazard Classification:

Health: 2. 2= Materials that, on intense or continued (but not chronic) exposure, could cause temporary incapacitation or possible residual injury, including those requiring the use of respiratory protective equipment that has an independent air supply. These materials are hazardous to health, but areas may be entered freely if personnel are provided with full-face mask self-contained breathing apparatus that provides complete eye protection.
[Fire Protection Guide to Hazardous Materials. 12 ed. Quincy, MA: National Fire Protection Association, 1997., p. 325-81] **PEER REVIEWED**

Flammability: 3. 3= This degree includes Class IB and IC flammable liquids and materials that can be easily ignited under almost all normal temperature conditions. Water may be ineffective in controlling or extinguishing fires in such materials.
[Fire Protection Guide to Hazardous Materials. 12 ed. Quincy, MA: National Fire Protection Association, 1997., p. 325-81] **PEER REVIEWED**

Reactivity: 0. 0= This degree includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used.
[Fire Protection Guide to Hazardous Materials. 12 ed. Quincy, MA: National Fire Protection Association, 1997., p. 325-81] **PEER REVIEWED**

Flammable Limits:

Lower flammable limit: 0.8% by volume; Upper flammable limit: 6.0% by volume
[Fire Protection Guide to Hazardous Materials. 12 ed. Quincy, MA: National Fire Protection Association, 1997., p. 325-81] **PEER REVIEWED**

Flash Point:

86 deg F (closed cup)
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

Autoignition Temperature:

842 deg F
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

Fire Fighting Procedures:

To fight fire, use foam, carbon dioxide, dry chemical.
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

If material on fire or involved in fire: Do not extinguish fire unless flow can be stopped or safely confined. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. Keep run-off water out of sewers and water sources.
[Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 919] **PEER REVIEWED**

Explosive Limits & Potential:

LEL: 0.8%; UEL: 6%

[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

A moderate explosion hazard in the form of vapor when exposed to heat or flame.
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

Hazardous Reactivities & Incompatibilities:
... Can react with oxidizing materials.
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

Hazardous Decomposition:
When heated to decomposition it emits acrid smoke and fumes.
[Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 1962] **PEER REVIEWED**

Preventive Measures:
If material not on fire and not involved in fire: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors.
[Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 919] **PEER REVIEWED**

Personnel protection: Avoid breathing vapors. Keep upwind. ... Avoid bodily contact with the material. ... Do not handle broken packages unless wearing appropriate personal protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. ... If contact with the material anticipated, wear appropriate chemical protective clothing.
[Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 919] **PEER REVIEWED**

Shipment Methods and Regulations:
No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./
[49 CFR 171.2 (7/1/99)] **PEER REVIEWED**

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.
[International Air Transport Association. Dangerous Goods Regulations. 47th Edition. Montreal, Quebec Canada. 2006., p. 243] **QC REVIEWED**

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.
[International Maritime Organization. International Maritime Dangerous Goods Code. London, UK. 2004., p. 111] **QC REVIEWED**

Disposal Methods:
SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.
PEER REVIEWED

The following wastewater treatment technologies have been investigated for n-propyl benzene: concentration

process: biological treatment.
[USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-47 (1982)] **PEER REVIEWED**

Occupational Exposure Standards:

Manufacturing/Use Information:

Major Uses:
Mfg methylstyrene; textile dyeing; printing solvent for cellulose acetate; asphalt and naphtha constituent.
[Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 3rd ed. New York, NY: Van Nostrand Reinhold Co., 1996., p. 1586-7] **PEER REVIEWED**

Manufacturers:
Frank Enterprises, Inc, Hq, 1960 Birkdale Dr, Columbus, OH 43232, (614) 861-7010
[SRI. 1989 Directory of Chemical Producers -United States of America. Menlo Park, CA: SRI International, 1989., p. 925] **PEER REVIEWED**

Methods of Manufacturing:
Prepd by the action of diethyl sulfate on benzyl magnesium chloride.
[Budavari, S. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 1996., p. 1348] **PEER REVIEWED**

... IS PRODUCED IN PETROLEUM REFINING & AS BYPRODUCT OF CUMENE MFR.
[National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

PROBABLY BY ALKYLATION OF BENZENE WITH N-PROPYL CHLORIDE IN THE PRESENCE OF ALUMINUM CHLORIDE; FRACTIONAL DISTILLATION OF PETROLEUM REFORMATE.
[SRI] **PEER REVIEWED**

Reaction of benzylmagnesium chloride and diethyl sulfate.
[Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 933] **PEER REVIEWED**

Petroleum refining; by-product of cumene mfg.
[Ashford, R.D. Ashford's Dictionary of Industrial Chemicals. London, England: Wavelength Publications Ltd., 1994., p. 1586] **PEER REVIEWED**

U. S. Production:
(1977) AT LEAST 4.54X10+10 GRAMS
[SRI] **PEER REVIEWED**

Laboratory Methods:

Analytic Laboratory Methods:
A modified variant of the purge-and-trap gas chromatographic analysis of volatile organic carbon compounds in water is described. The method separated over 200 organic compounds within 40 min using flame ionization and ion trap detection and is capable of quantitation down to 5 ng/l per component. The recoveries of n-propylbenzene from water at 30 and 60 C were 84 and 99%, respectively.
[Bianchi A et al; J Chromatogr 467 (1): 111-28 (1989)] **PEER REVIEWED**

EPA Method 524.2. Purge-and-Trap Gas Chromatography/Mass Spectrometry. The method is applicable for the determination of volatile aromatic compounds in water, finished drinking water, raw source water or drinking water in any treatment stage. For n-propylbenzene the method has a detection limit of 0.10 ug/l and a relative standard deviation of 5.8% ug/l with a wide bore capillary column.

[USEPA; Methods for the Determination of Organic Compounds in Ffinished Drinking Water and Raw Source Water (1986)] **PEER REVIEWED**

EPA Method 502.2. Purge-and-Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series. The method is applicable for the determination of volatile organic compounds in finished drinking water, raw source water, or drinking water in any treatment stage. For n-propylbenzene the method has a detection limit of 0.004 ug/l, a percent recovery of 103%, and a relative standard deviation of recovery of 2.0 using the photoionization detector; and a method detection limit not given ug/l, a percent recovery not given and a standard deviation not given using the electrolytic conductivity detector.
[USEPA; Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water (1986)] **PEER REVIEWED**

AOB Method VG-011-1. Halogenated and Aromatic Volatile Organic Compounds (VOCs) in Whole Gas Analyzed by Purge and Trap GC/ELCD/PID.
[USEPA; EMMI. EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)] **PEER REVIEWED**

EMSLC Method 502.2. Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series. Revision 2.0. Minimum detection limit= 0.01 ug/l.
[USEPA; Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, December 1988, Revised July 1991 as cited in USEPA; EMMI. EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)] **PEER REVIEWED**

EMSLC Method 503.1. Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography. Revision 2.0. Minimum detection limit= 0.009 ug/l.
[USEPA; Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, December 1988, Revised July 1991 as cited in USEPA; EMMI. EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)] **PEER REVIEWED**

EMSLC Method 524.2. Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry. Revision 4.0. Minimum detection limit= 0.040 ug/l.
[USEPA; Methods for the Determination of Organic Compounds in Drinking Water, Supplement II, EPA/600/R-92/129, August 1992 as cited in USEPA; EMMI. EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)] **PEER REVIEWED**

EPA Method 5021. Volatile Organic Compounds in Soils and Other Solid Matrices Using Equilibrium Headspace Analysis.
[USEPA/Office of Solid Waste (OSW); Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods, SW-846 Proposed as cited in USEPA; EMMI. EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)] **PEER REVIEWED**

EPA Method 5021A. Analysis of Halogenated and Aromatic Volatiles By Gas Chromatography using Electrolytic Conductivity and Photoionization Detectors in Series: Capillary Technique. Detection limit= 0.004 ug/l.
[USEPA/Office of Solid Waste (OSW); Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods, SW-846, 3rd Edition, Final Update II, September (1994)] **PEER REVIEWED**

Special References:

Synonyms and Identifiers:

Synonyms:
BENZENE, PROPYL-
PEER REVIEWED

1-PHENYLPROPANE
PEER REVIEWED

PROPYLBENZENE
PEER REVIEWED

1-PROPYLBENZENE

PEER REVIEWED

Shipping Name/ Number DOT/UN/NA/IMO:
UN 2364; n-Propylbenzene

IMO 3.3; n-Propylbenzene

Administrative Information:

Hazardous Substances Databank Number: 5353

Last Revision Date: 20030402

Last Review Date: Reviewed by SRP on 1/29/2000

Update History:
Field Update on 2010-06-02, 4 fields added/edited/deleted
Field Update on 2007-06-07, 1 fields added/edited/deleted
Field Update on 2006-04-18, 2 fields added/edited/deleted
Field Update on 2006-04-17, 2 fields added/edited/deleted
Field Update on 2005-04-29, 4 fields added/edited/deleted
Complete Update on 04/02/2003, 51 fields added/edited/deleted.
Field Update on 10/31/2002, 1 field added/edited/deleted.
Field Update on 01/14/2002, 1 field added/edited/deleted.
Field Update on 08/08/2001, 1 field added/edited/deleted.
Field Update on 09/12/2000, 1 field added/edited/deleted.
Field Update on 06/12/2000, 1 field added/edited/deleted.
Field Update on 06/12/2000, 1 field added/edited/deleted.
Field Update on 02/02/2000, 1 field added/edited/deleted.
Field Update on 09/21/1999, 1 field added/edited/deleted.
Field Update on 08/26/1999, 1 field added/edited/deleted.
Complete Update on 06/03/1998, 1 field added/edited/deleted.
Complete Update on 11/01/1997, 1 field added/edited/deleted.
Complete Update on 04/23/1997, 2 fields added/edited/deleted.
Complete Update on 01/29/1996, 1 field added/edited/deleted.
Complete Update on 11/09/1995, 1 field added/edited/deleted.
Complete Update on 05/26/1995, 1 field added/edited/deleted.
Complete Update on 01/05/1995, 1 field added/edited/deleted.
Complete Update on 04/04/1994, 1 field added/edited/deleted.
Complete Update on 02/28/1993, 2 fields added/edited/deleted.
Field update on 01/06/1993, 1 field added/edited/deleted.
Complete Update on 11/06/1991, 51 fields added/edited/deleted.
Complete Update on 10/22/1990, 8 fields added/edited/deleted.
Field Update on 03/07/1990, 1 field added/edited/deleted.
Field Update on 03/06/1990, 1 field added/edited/deleted.
Complete Update on 11/21/1989, 11 fields added/edited/deleted.
Complete Update on 10/03/1986
Created 19830401 by SYS