



# ChemicalWatch Factsheet

A Beyond Pesticides/ NCAMP Factsheet

## Naphthalene

Naphthalene is considered to be the most abundant single constituent of coal. This compound is rarely used now in moth balls, because its acute toxicity to man is much greater than that of the more commonly used paradi-chlorobenzene (PDCB). Naphthalene is now used mostly in the manufacture of dyes, lubricants, and other non-pesticide components, but it may still be found for sale to consumers. Naphthalene and PDCB look very much alike, and both can be formulated into flakes or balls, but naphthalene is less soluble in solvents, and appears dry, while PDCB looks oily and moist.

Clinically, naphthalene ingestion is treated as an emergency. Ingestion or prolonged inhalation (naphthalene is quite volatile) may produce fever, nausea, diarrhea, abdominal pain, pallor, jaundice and / or liver necrosis, and dark urine, which is the result in some individuals of a dramatic hemolytic reaction. Hemolysis, the destruction of red blood cells, is often seen in individuals with a genetic deficiency in the enzyme glucose-6-phosphate dehydrogenase (G6PD), which is seen most particularly in dark-skinned people (e.g. Blacks, Asians, Latinos, and Mediterranean people). This trait is sex-linked, usually fully expressed preferentially in males.

Naphthalene can cause skin irritations, and is readily absorbed through any route. Babies, especially, can easily absorb enough naphthalene from treated clothing to experience acute systemic reactions. One journal article described acute hemolysis and kernicterus (a serious neonatal jaundice, in which pigment is deposited in the brain) among 21 Greek newborns, 9 of whom had G6PD deficiency. They had all been exposed to naphthalene via blankets and clothing stored over the summer. It is important to note that naphthalene is not easy to remove from cloth articles by washing, since it is not very soluble. Toxicity occurred in some cases as early as 1 day after exposure, and two of the infants died.

Treatment of poisoning involves inducing vomiting, and in extreme cases protecting the kidneys from failing and the administration of blood transfusions.

Naphthalene is not itself hemolytic, in other words when mixed with blood directly it does not cause hemolysis. Rather the hemolytic agent is a metabolite, alpha-naphthol. Another metabolite, naphthalene dihydrodiol, converts in the eye to an agent that may cause cataracts.

### *chemicalWATCH* Stats:

**CAS Registry Number:** 91-20-3

**Chemical Class:** Aromatic hydrocarbon

**Use:** Primary use for the production of phthalic anhydride. Also used for carbamate insecticides, surface active agents and resins, as a dye intermediate, as a synthetic tanning agent and as a moth repellent.

**Toxicity rating:** Slightly to Moderately Toxic

**Health Effects:** Can cause cataracts and damage to the retina. Acute exposure to naphthalene by inhalation, ingestion, and dermal contact is associated with hemolytic anemia, damage to the liver, and neurological damage. Classified as a Group C, possible human carcinogen.

**Environmental Effects:** Moderate to low mobility in soil. Naphthalene has been detected in untreated ambient ground water samples.

**UPDATE: October 2007**

Naphthalene is currently used in the manufacture of phthalic anhydride, which is used as an intermediate in the production of phthalate plasticizers, resins, dyes, pharmaceuticals, insect repellents, and other materials. Naphthalene is also a component of crude oil and also occurs naturally in the essential oils of the roots of *Radix* and *Herba ononidis*. Studies involving rabbits and pregnant rats have reported treatment related signs of neurotoxicity; lethargy, slow respiration including periods of apnea, and/or inability to move after dosing. Subchronic studies however, have found no clinical signs of neurotoxicity. Naphthalene has been shown to be a weak developmental and reproductive toxicant with detectable effects occurring only at doses associated with substantial maternal toxicity.

Evidence for carcinogenic potential was observed in male and female rats exposed to 60-ppm naphthalene (approximately 20 mg/kg-day) by inhalation for 2 years, but statistical significance was only found for tumors of the respiratory track. Oral exposure studies have been found inadequate to determine carcinogenic potential. The EPA's Integrated Risk Information System (IRIS) classified naphthalene as a Group C: possible human carcinogen, however, using the 1996 Proposed Guidelines for Carcinogen Risk Assessment, it was found that the carcinogenic potential of naphthalene "cannot be determined." New data have shown evidence for carcinogenic activity within the nasal cavity, strengthening the association between the inhalation route of exposure and carcinogenicity. As a result, the carcinogenic potential of naphthalene via the inhalation route needs to be re-evaluated.

The International Agency for Research on Cancer (IARC) has noted that there is sufficient evidence in experimental animals for the carcinogenicity of naphthalene, and has listed naphthalene as possibly carcinogenic to humans (Group 2B) and it is also listed as a known carcinogen in the state of California.

The most likely exposure to naphthalene comes from inhalation due to the release of the substance from combustion fuels, moth repellents, and cigarette smoke. Continuous handling of naphthalene may produce a dermatitis characterized by itching, redness, scaling, weeping and crusting of the skin; for example, clothes stored with moth balls and used directly on infants have caused skin rashes and systemic poisoning. Naphthalene has moderate to low mobility in soils and biodegrades with a half-life between 2-18 days. It is slightly to moderately toxic to fish and other aquatic organisms.

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## **Naphthalene *chemicalWATCH* Factsheet Bibliography**

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