



Division of Occupational Safety and Health
N.C. Department of Labor
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Raleigh, North Carolina 27699-1101

Cherie K. Berry
Commissioner

HEALTH HAZARD ALERT

1-Bromopropane (n-Propyl Bromide)

1-Bromopropane (1-BP) is a new solvent that is effective in dissolving fats, waxes and resins. Two of its main uses are in degreasing agents and in spray adhesives. 1-BP is being used in the furniture industry and as a solvent for adhesives used in constructing foam cushions. The dry cleaning industry, among others, has considered using 1-BP as a replacement for other organic solvents that damage the ozone layer in the upper atmosphere.

The N.C. Department of Labor's Division of Occupational Safety and Health (OSH), is very concerned about the health effects of 1-bromopropane. OSH is issuing this health hazard alert because 1-bromopropane is being considered for widespread use and is not regulated to protect workers, consumers or the environment. North Carolina does not currently have a permissible exposure limit for 1-bromopropane. The American Conference of Governmental Industrial Hygienists recently published a recommended time-weighted average threshold limit value of 10 parts per million, which is equivalent to 50 milligrams of 1-bromopropane (1-BP) per cubic meter of air.¹

Hazards: 1-Bromopropane can harm both the nervous system and the reproductive system. It can damage the nervous system by interfering with nerve conduction, resulting in limb weakness, pain, numbness, and paralysis.^{2,3} It can cause reduced fertility and/or sterility in test animals, both male and female, and it can harm the developing fetus in pregnant female test animals. It will soon be tested to find out if it can cause cancer, as many similar chemicals do. Other harmful effects include irritation of the eyes and skin.⁴

Health Effects

1-Bromopropane enters your body when you breathe its vapor or drops of spray in the air. It can also enter through your skin and cause significant problems, depending on the concentration of 1-BP in the air, your skin contact and exposure time. The toxic effects of 1-bromopropane in humans have not yet been well studied. Because it is a recently introduced chemical, most information comes from animal testing and not from experience with human use. In most of the animal tests, the animals were exposed to 1-bromopropane by breathing it in the air. The following outlines health effects that have been studied.

Reproductive System

1-Bromopropane damages the reproductive systems in both male and female animals. In males, it damages the sperm, testicles, prostate, epididymis and seminal vesicles and reduces testosterone levels, causing sterility. In females, it damages the ovaries and interferes with the estrous cycle, again causing sterility. 1-Bromopropane also caused delayed growth in the offspring of animals exposed during pregnancy. Some of these effects were seen at exposure levels as low as 200 ppm in the air, and possibly even at 100 ppm. The reproductive toxicity of 1-bromopropane has not been studied in humans, but 2-bromopropane, a closely related chemical, has been found to cause long-lasting ovarian failure and absence of sperm in workers.

Nervous System

1-Bromopropane damages the nerves in the arms, legs and body. There is evidence that 1-bromopropane may also damage the brain. Animal tests have found these effects with exposures as low as 400 ppm. Case reports show that similar effects can occur in humans.

Eyes, Nose, Throat and Skin

1-Bromopropane is irritating to the eyes, nose and throat at exposure levels of perhaps 30 ppm. Like other organic solvents, the liquid can dissolve the natural protective oils on skin and cause dermatitis (dry, rough, red, cracked skin).

Liver

Very high exposures may harm the liver. It is not known whether exposure levels likely to be found in the workplace present any risks to the liver.

Cancer

1-Bromopropane will soon be tested to see whether it can cause cancer. Many similar chemicals, such as dibromochloropropane, do cause cancer. In some tests, but not in others, 1-bromopropane has caused genetic mutations. Chemicals that cause mutations can often cause cancer as well.



How to Reduce Health Risks

- **Substitution.** The best way to reduce exposure is to switch to products that do not contain 1-bromopropane.
- **Using less.** If 1-bromopropane products must be used, quantities should be kept as small as possible, and containers should be kept closed between uses.
- **Other engineering controls.** Vapor degreasing systems should include controlled hoists, effective cooling coils and lids.
- **Ventilation.** Make sure that there is good ventilation. Local exhaust ventilation is most effective because it captures contaminated air at the source.
- **Personal protective equipment.** Aprons, gloves, goggles and respirators approved for use with organic chemicals can be effective in helping workers avoid exposure.
- **Respiratory protection.** Respirators may be used only if ventilation and other control methods are not effective and feasible.

Requirements for Employers: Even if a chemical is not regulated by an OSH standard, employers are still required to “furnish ... conditions of employment and a place of employment free from recognized hazards.” Employers also must ensure that employees do not suffer illness or injury from the use of any chemical agent.

Rights of Employees: If you think you may be exposed to 1-bromopropane on the job, ask to see the material safety data sheets (MSDS) for the products you are using. The MSDS for a product that contains 1-bromopropane must identify it in Section 2, by the CAS number 106-94-5. 1-Bromopropane is also called n-propyl bromide. Some MSDSs do not fully describe the hazards of the product. Your employer must tell you if you are working with 1-bromopropane and must train you to use it safely (ref. Hazard Communication Standard, Subpart Z 1910.1200, Toxic and Hazardous Substances).

Copies of safety and health standards for 29 CFR 1910 (General Industry) and 29 CFR 1926 (Construction) are available from NCDOL/ETTA upon request. Publications can also be ordered online (www.nclabor.com).

For more information concerning education, training and interpretations of occupational safety and health standards contact:

Bureau of Education, Training and Technical Assistance

Fourth Floor, Old Revenue Building, Raleigh N.C.
Telephone: (919) 807-2875 Fax: (919) 807-2876

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Bureau of Consultative Services

Third Floor, Old Revenue Building, Raleigh, N.C.
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N.C. Department of Labor Web Site: <http://www.nclabor.com>

Toll Free Number: 1-800-NC-LABOR (1-800-625-2267)

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1. American Conference of Governmental Industrial Hygienists, 2005.
 2. Yu, et al. Preliminary Report on the Neurotoxicity of 1-Bromopropane, an Alternative Solvent for Chlorofluorocarbons, J. Occup Health 1998; 40:234-235.
 3. Ichihara, et al. Neurological Disorders in Three Workers Exposed to 1-Bromopropane, J. Occup Health 2002; 44:1-7.
 4. ICSC:1332, International Programme on Chemical Safety and the Commission of the European Communities.