

1-Bromopropane (n-Propyl Bromide)

1-Bromopropane can harm the reproductive system and the nervous system.

It causes sterility in both male and female test animals, and harms the developing fetus when tested in pregnant animals. 1-Bromopropane can damage the nerves, causing weakness, pain, numbness, and paralysis. It will soon be tested in animals to find out if it can cause cancer, as many similar chemicals do. The effects of 1-bromopropane on human health have not been well studied. However, a few human case reports suggest that 1-bromopropane can harm the nervous system. 1-Bromopropane is a new solvent intended to replace solvents like trichloroethane and some Freons that damage the upper ozone layer. HESIS is issuing this Hazard Alert because 1-bromopropane is being considered for widespread use and is not regulated to protect workers, consumers, or the environment.

**Health
Hazard
ALERT**

How to find out if you are working with 1-bromopropane

1-Bromopropane is a solvent. It might be used wherever there is a need to dissolve fats, waxes, or resins. So far, two of its main uses are in degreasing and in spray adhesives. It is being considered for use in drycleaning and for many other uses as a replacement for other organic solvents that damage the upper ozone layer.

Your employer must tell you if you are working with 1-bromopropane, and must train you to use it safely (California Code of Regulations, Title 8, Sections 3203 and 5194). If you think you may be exposed to 1-bromopropane on the job, ask to see the Material Safety Data Sheets (MSDSs) 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.

How 1-bromopropane enters your body

1-Bromopropane enters your body when you breathe its vapor or drops of spray in the air. Some can enter your body through your skin.

Your risk of health effects depends on the amount of 1-bromopropane that enters your body. That depends mainly on the amount (the concentration) of 1-bromopropane in the air, your skin contact, and how long you are exposed.

How 1-bromopropane can affect your health

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, not from experience with human use.

In most of the animal tests, the animals breathed 1-bromopropane in the air. However, you can also absorb 1-bromopropane through your skin.

**HEALTH HAZARD
ALERT**



HESIS

HAZARD EVALUATION SYSTEM & INFORMATION SERVICE

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Occupational Health Branch

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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 parts per million (200 “ppm”) in air, and possibly even at 100 ppm.

Reproductive toxicity of 1-bromopropane has not been studied in humans, but the closely related chemical 2-bromopropane 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 itself. 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

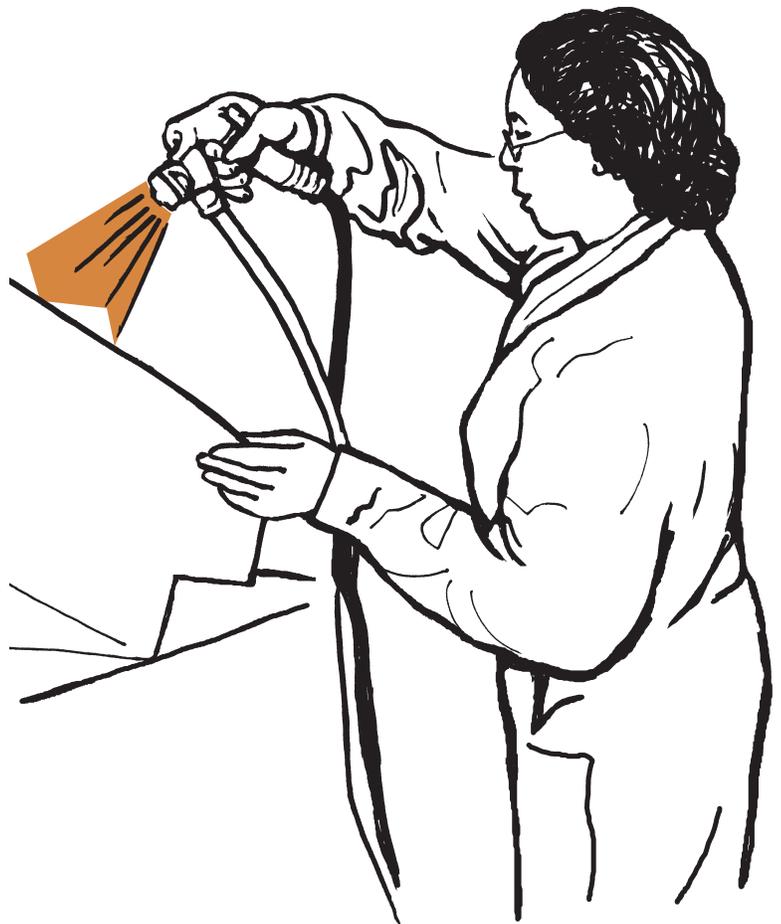
1-Bromopropane is irritating to the eyes, nose, and throat, at exposure levels of perhaps 30 ppm. Like other organic solvents, the liquid can dissolve the natural protective oils on your skin and cause dermatitis (dry, rough, red, cracked skin). It can also be absorbed into your body through the skin.

LIVER

Very high exposures may harm the liver. We don't know whether there's any risk to the liver from exposure levels likely to be found in the workplace.

CANCER

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



HOW TO REDUCE YOUR EXPOSURE

Even though there is no Permissible Exposure Limit (PEL) for 1-bromopropane (see page 4), Cal/OSHA's Title 8, Section 5141 requires your employer to protect you from being exposed to chemicals at levels that harm your health. See www.dir.ca.gov/title8/5141.html.

Cal/OSHA and the Cal/OSHA Consultation Service can help you and your employer – see “Where to Get Help” on the last page.

- ▶ **Substitution.** The best way to reduce exposure is to switch to products that don't contain 1-bromopropane. Avoid using products for which you do not have an MSDS.

Switch to water-based adhesives, when possible, for flexible foam fabrication. Hot water-based aqueous cleaning detergents often can be substituted for 1-bromopropane products for vapor degreasing and cold cleaning operations.

If you can't switch to 1-bromopropane-free products, take other steps to limit your exposure.

- ▶ **Using Less.** If you must use 1-bromopropane products, use as little as possible. Keep containers closed between uses. 1-Bromopropane can evaporate from 1-bromopropane-soaked rags, so make sure that used rags are kept in a well-ventilated area or sealed in an airtight container.
- ▶ **Ventilation.** Make sure that there is good ventilation. “Local exhaust ventilation” is most effective; it captures contaminated air at the source, before 1-bromopropane can spread into your breathing zone. In a study conducted by the National Institute for Occupational Safety and Health (NIOSH), for example, improving the local exhaust ventilation reduced 1-bromopropane levels by about 70% in a cushion manufacturing plant. Next best is general ventilation, which uses a fan-powered system to bring fresh air into the work area. Open doors and windows usually provide very little ventilation. An indoor fan that just blows contaminated air around without removing it from your work area is not effective.

- ▶ **Other Engineering Controls.** Vapor degreasing systems should include controlled hoists, effective cooling coils, and lids. Vapor degreasing should be isolated from other work areas. If parts are removed wet, the drying area should be vented to the outdoors.

- ▶ **Respiratory Protection.** Respirators may be used only if ventilation and other control methods are not effective and feasible. A half-face respirator with organic vapor cartridge can reduce your exposure. In spraying operations, this should be combined with a mist pre-filter cartridge. A “dust mask” will not protect you, and may even increase your exposure by giving a false sense of confidence. Employers must comply with the Cal/OSHA Respiratory Protection Standard (Title 8, Section 5144). See www.dir.ca.gov/title8/5144.html.

- ▶ **Skin Protection.** It may be hard to avoid getting 1-bromopropane on your hands if you use it for cleaning or gluing. If you must use 1-bromopropane products and it is likely that it will get on your skin, wear protective gloves and replace them often. Chemical protective clothing, such as aprons or sleeves, may also be needed if skin contact occurs at areas other than your hands. California regulation (Title 8, Section 3384) requires employers to supply gloves or any other necessary protective equipment. Viton, Silvershield, and 4H glove materials may resist penetration by 1-bromopropane longer than most other materials. 1-Bromopropane can penetrate some common glove materials within 30 minutes to two hours.

Legal exposure limits

1-Bromopropane is a virtually unregulated chemical. Cal/OSHA does not have a Permissible Exposure Limit (PEL) for workplace exposure. Neither the U.S. Environmental Protection Agency (U.S. EPA) nor Cal/EPA has set any limits on 1-bromopropane in the environment. U.S. EPA is considering approving 1-bromopropane for use as an alternative to chemicals that damage the ozone layer in the upper atmosphere.

Recommended exposure limits

HESIS recommends that workplace exposure be limited to about 1 ppm in order to protect against the reproductive and nerve toxicity of 1-bromopropane. HESIS also recommends a skin notation to require protection against skin contact exposure.

Many manufacturers and distributors have made recommendations for occupational exposure limits. These proposals range from 5 ppm to 100 ppm.

Measuring your exposure

The amount of 1-bromopropane in the air in your workplace can and should be measured. However, until 1-bromopropane is regulated by Cal/OSHA, there may not be any legal standard to compare the results to.

Are there medical tests for exposure and health effects?

1-Bromopropane levels in urine reflect recent exposure fairly accurately, but the test is difficult and expensive. Bromine levels in urine also reflect recent exposure, but other exposures may influence the test. Standard tests for reproductive function, nervous system damage, and blood effects may be appropriate if you work with 1-bromopropane.

Regulations that help to protect workers

HAZARD COMMUNICATION STANDARD.

Under this standard (Title 8, Section 5194), your employer must tell you if any hazardous substances are used in your work area, must train you to use them safely, and must make MSDSs available. See www.dir.ca.gov/title8/5194.html.

INJURY AND ILLNESS PREVENTION PROGRAM.

Every employer must have an effective, written Injury and Illness Prevention Program (IIPP) that identifies a person with the authority and responsibility to run the program (Title 8, Section 3203). The IIPP must include methods for identifying workplace hazards, methods for correcting hazards quickly, health and safety training at specified times, a system for communicating clearly with all employees about health and safety matters (including safe ways for employees to tell the employer about hazards), and record-keeping to document the steps taken to comply with the IIPP Standard. See www.dir.ca.gov/title8/3203.html.

ACCESS TO MEDICAL AND EXPOSURE RECORDS.

You have the right to see and copy your own medical records, and any records of toxic substance exposure monitoring (Title 8, Section 3204). These records are important in determining whether your health has been affected by your work. Employers who have such records must keep them and make them available to you for at least 30 years after the end of your employment. See www.dir.ca.gov/title8/3204.html.

DO YOU USE ANY OF THESE PRODUCTS?

Abzol
Albatross VDS-3000
Alpha Metals VaporEdge 1000
Amrep Misty Safety Solvent 2000
Ceramicrome Overglazes 6, 8, 9, or 18
Ecolink Hypersolve
Ecolink Triagen
EnSolv; EnSolv-A; EnSolv-CW
Hypersolve NPB; Hypersolve ASC
K-Grip 501 Spray Adhesive
Leksol
LPS Instant Super Degreaser II
Micro Care PowrClean Solvent
NPB Heavy Duty Cleaner Degreaser
NPB Heavy Duty Contact Cleaner
NPB Heavy Duty Flux Remover
Nye Lubricants Fluorosolvent 507
Nye Lubricants Nyetact 502H-20
Pensolve PB2000
Petroferm Lenium
Petroferm nPB Stabilizer Booster
Rite-Off Generation 2000 Bromo-Clean
Solvon PB, PBA, AER, ACS, DR, or IP
Techtride DG
Tek-Rap Series 200-20D Low-VOC/HAPs
Liquid Adhesive Coating
United C174 Aerosol Contact Cleaner
Western Chemical

These are some products with MSDSs showing that they contain 1-bromo-propane. However, products like these can change their ingredients quite often. Be sure to check the current MSDS for whatever products you're using.



WHERE TO GET HELP

- **HESIS** answers questions about 1-bromopropane and other workplace hazards and has many free publications available.

For information on workplace hazards: **(510) 622-4317**. Please leave a message and your call will be returned.

For HESIS Publications: **(510) 622-4138**. Call, or visit our website www.dhs.ca.gov/ohb, or write to HESIS, 1515 Clay Street, Suite 1901, Oakland, CA 94612.

- *HESIS Guide to Solvent Safety*. Discusses health and safety hazards and protective measures.
 - *Workplace Chemical Hazards to Reproductive Health: A Resource for Worker Health and Safety Training and Patient Education*. Explains how chemicals can affect reproduction.
 - *HESIS Publication List*. Fact sheets, booklets, and medical guidelines on workplace hazards including chemicals, repetitive motion, and infectious diseases. Visit our website, call, or write for the list.
- **California Division of Occupational Safety and Health (Cal/OSHA)** investigates workers' complaints, makes enforcement inspections, and answers questions about workplace health and safety regulations. Complainants' identities are kept confidential. Contact the Cal/OSHA Enforcement District office nearest to your workplace. Offices are listed in the blue government section near the front of the phone book, under "State Government / Industrial Relations / Occupational Safety and Health / Enforcement," or visit their website at www.dir.ca.gov/DOSH/districtoffices.htm.

- **Other resources for employees** may include your supervisor, your union, your company health and safety officer, your doctor, or your company doctor.

- **Cal/OSHA Consultation Service** helps employers who want free, non-enforcement help to evaluate the workplace and improve the health and safety conditions. Employers can call **(800) 963-9424**.

- **Occupational health services** can be found at:

- UC San Francisco/SFGH Occupational and Environmental Medicine Clinic: (415) 885-7580.
- UC Davis Occupational and Environmental Medicine Clinic: (530) 754-7635.
- UC Irvine Center for Occupational and Environmental Health: (949) 824-8641.
- UC San Diego Center for Occupational and Environmental Medicine: (619) 471-9210.



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