

1-Bromopropane (n-Propyl Bromide)

1-Bromopropane, also called 1-BP, is a solvent used in degreasing, spray adhesives, aerosol solvents, and dry cleaning that can cause **serious health damage**. We have known for some time that 1-BP harms the reproductive and nervous systems. **There is now evidence that shows that 1-BP may also damage the genes and cause cancer.** Cal/OSHA has a legal limit on how much 1-BP can be in the air workers breathe, but it was set before this cancer risk became more evident. HESIS is issuing this Hazard Alert so workers who use or come in contact with 1-BP can be protected.

**Health
Hazard
ALERT**

Do you work with 1-bromopropane?

1-Bromopropane is a solvent used to dissolve fats, waxes, and resins. Two of its main uses are in degreasing and in spray adhesives. In recent years, 1-BP has been used as a replacement for other organic solvents that damage the ozone layer. You may use 1-BP at work if you:

- Do vapor or other types of degreasing
- Use adhesives for foam cushion or furniture fabrication
- Perform dry cleaning
- Do precision cleaning
- Use aerosol (spray) solvents
- Clean electronics or metal items
- Apply coatings to pipes or other fixtures.

Page 5 has examples of common products that contain 1-BP.

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.

How 1-bromopropane can affect your health

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

As with many chemicals, our information about how 1-BP can affect your health comes from both human and animal studies. HESIS uses both kinds of information to determine how a chemical might affect worker health. In the case of 1-BP, it is now well established from animal and human studies that 1-BP has serious effects on human health.

HEALTH HAZARD



HAZARD EVALUATION SYSTEM & INFORMATION SERVICE

California Department of Public Health • Occupational Health Branch
850 Marina Bay Parkway, Bldg. P, 3rd Floor, Richmond, CA 94804
510-620-5757 • [Occupational Health Branch \(www.cdph.ca.gov/ohb\)](http://www.cdph.ca.gov/ohb)

CANCER

1-BP causes cancer in laboratory animals. Animals exposed to 1-BP in air and drinking water were found to have increases in lung, intestine, and skin cancers. Because of these findings, scientific experts are concerned that it may cause cancer in workers. One of these scientific agencies, the National Toxicology Program, states that 1-BP is “reasonably anticipated to be a human carcinogen.” In the state of California, 1-BP has been listed under Proposition 65 as known to cause cancer.

NERVOUS SYSTEM

Short-term exposures to 1-BP can affect the brain the same way other organic solvents and alcohol do, causing headache, nausea, dizziness, clumsiness, or drowsiness. Chronic, long-term exposures can also harm the nervous system. 1-BP damages the nerves in the arms, legs, and body. A number of studies have found long-lasting adverse effects on the brain and peripheral nervous systems in workers who were exposed to 1-BP on the job.

REPRODUCTIVE SYSTEM

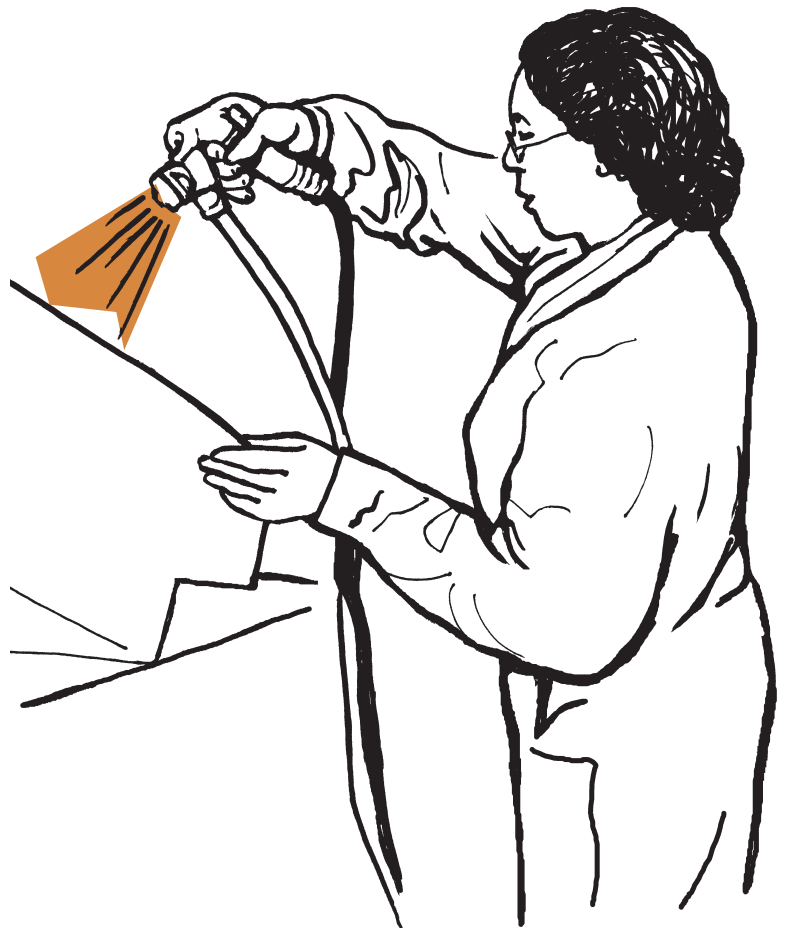
While human studies are limited, 1-BP harms the reproductive systems in both male and female animals. In males, it damages the sperm, testicles, prostate, and other structures. It reduces testosterone levels, causing sterility. In females, 1-BP damages the ovaries and interferes with the menstrual cycle, again causing sterility. 1-BP was also found to cause delayed growth in the offspring of animals exposed during pregnancy. The National Toxicology Program has concluded that there is serious concern for reproductive and developmental effects in the workplace at high levels of exposure. 1-BP is now listed under Proposition 65 as known to cause reproductive and developmental toxicity.

LIVER and KIDNEYS

In animal studies, 1-BP harms both the liver and the kidney. We don't yet know the effects on these organs at levels found in the workplace.

EYES, NOSE, THROAT, and SKIN

1-BP is irritating to the eyes, nose, throat and skin. 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.



Worker spraying adhesive on foam blocks

HOW TO REDUCE EXPOSURE

The law requires employers to provide a safe and healthy workplace. This includes protecting workers from harmful chemicals such as 1-bromopropane. Here are some of the things you and your employer can do to protect you.

Use safer products. The best way to reduce exposure is to switch to products that don't contain 1-BP. Ask your supplier if other alternatives are available. Avoid using products for which you do not have a Safety Data Sheet.

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

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

Use less of the product. If you must use products that contain 1-BP use as little as possible. Keep containers closed between uses. 1-BP can evaporate from 1-BP-soaked rags so make sure that used rags are kept in a well-ventilated area or sealed in an airtight container.

Enclose the process and use good ventilation. Enclose or isolate the work process as much as possible' preferably having the worker on the outside of the enclosure. Use "local exhaust ventilation" to capture contaminated air at the source before 1-BP can get into workers' breathing zone. A good example of this is enclosing the work in a spray booth that has its own source for clean air. Another example is to mechanize the measuring' mixing' and pouring of 1-BP-containing ingredients inside enclosed piping or vessels. Studies have shown that using good local exhaust ventilation can remove much of the 1-BP from workplace air.

Other protective measures. 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 are the least reliable way to reduce exposure. Cal/OSHA permits the use of respirators to protect workers from harmful chemicals only if ventilation and other control methods are not effective or feasible. A respirator with organic vapor cartridges can further reduce your exposure. In spraying operations, these cartridges should be combined with mist pre-filters. A "dust mask" will not protect you from 1-BP.

Protect your skin. It may be hard to avoid getting 1-BP on your hands if you use it for cleaning or gluing. If you must use 1-BP products, wear protective gloves and replace them often. 1-BP can penetrate some common glove materials within 10 minutes. Gloves that can protect you from 1-BP are those made of supported polyvinyl alcohol or multiple-layer laminated films such as Silvershield™ and Barrier™. You may also need chemical-protective clothing such as aprons or sleeves if skin contact occurs at areas other than your hands. California regulations require employers to supply gloves and appropriate protective clothing to prevent skin contact with 1-BP.

Protect your eyes. Wear chemical goggles full face shield, or a full face respirator. An eyewash station must be readily available wherever 1-BP is handled.

Cal/OSHA and the Cal/OSHA Consultation Services Branch help workers and employers follow health and safety laws and keep workers safe on the job. See "Where to Get Help" on page 6 for more information.

Legal exposure limits

Cal/OSHA has set a legal limit on the amount of 1-bromopropane that can be in the air workers breathe. The Permissible Exposure Limit or PEL is the maximum amount of 1-BP permitted in the air a worker breathes averaged over an 8-hour day. The PEL for 1-BP is 5 ppm (parts per million). Employers must maintain airborne 1-BP below this limit. The Cal/OSHA standard for 1-BP also has a skin notation, "S", which means it can be easily absorbed through the skin and get into the bloodstream. This can add to workers, overall exposure to 1-BP.

Recommended exposure limits

Because the current PEL for 1-BP was not set to protect against cancer, HESIS recommends that exposures be kept below the PEL and as low as possible.

Another organization, the American Conference of Governmental Industrial Hygienists, ACGIH, adopted a revised Threshold Limit Value, TLV, of 0.1 ppm, reduced from 10 ppm, in 2014 because non-cancer effects such as neurologic toxicity may occur at doses lower than previously appreciated.

Measuring exposure

Employers must measure the amount of 1-BP in the air at the workplace to make sure workers are not being exposed above the Cal/OSHA PEL.

Can medical tests show if someone is being exposed to 1-BP?

1-Bromopropane levels in urine reflect recent exposure fairly accurately, but the analysis must be conducted immediately after urine collection, making this test less practical. Bromine levels in urine also reflect recent exposure, but other factors may influence the test. Because the health implications of tests for 1-BP are unclear, routine testing is not recommended currently. Standard tests for reproductive function and nervous system damage may be appropriate if you work with 1-BP.

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, train you to use them safely, and make Safety Data Sheets, SDSs, available. See [Cal/OSHA Hazard Communication Standard](http://www.dir.ca.gov/title8/5194.html) (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 and reporting 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 workers to tell the employer about hazards), and record-keeping to document the steps taken to comply with the IIPP Standard. See [Cal/OSHA Injury and Illness Prevention Program Standard](http://www.dir.ca.gov/title8/3203.html) (www.dir.ca.gov/title8/3203.html).

RESPIRATORY PROTECTION.

This standard (Title 8, Section 5144) requires employers to provide respirators and implement a written respiratory protection program if respirators are necessary to protect workers from airborne hazards. Components of a respiratory protection program include medical evaluation, fit testing, and training, among other requirements. See [Cal/OSHA Respiratory Protection Standard](http://www.dir.ca.gov/title8/5144.html) (www.dir.ca.gov/title8/5144.html).

ACCESS TO MEDICAL AND EXPOSURE RECORDS.

You have the right to see and copy your own medical records, and any records related to measuring toxic substances you may have been exposed to on the job (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 [Access to Employee Exposure and Medical Records](http://www.dir.ca.gov/title8/3204.html) (www.dir.ca.gov/title8/3204.html).

DO YOU USE ANY OF THESE PRODUCTS?

Adhesives

- K-Grip 503 Spray Adhesive
- Polyken 1029 Liquid Adhesive

Cleaners and Degreasers

- Abzol
- BN-Bromothane S by Micro Care
- EnSolv EnSolv-A EnSolv-SC EnSolv GCS
- Hypersolve NPB Hypersolve ASC by Ecolink
- Instant Super Degreaser by LPS
- Lenium ES, Lenium GS, Lenium RV by Vantage Specialty Chemicals
- NPB Heavy Duty Cleaner Degreaser
- NPB Heavy Duty Contact Cleaner
- nPB Stabilizer Booster by Petroferm
- Pensolve PB2000
- Quik-Solv solvent degreaser
- Solvon PB, Solvon ACS, or Solvon IP
- Tech Kleen AER
- Triagen by Ecolink
- VDS-3000 by Albatross

Other Solvents

- Entron, Entron-CE, Entron-AE
- Leksol
- MST Safety Solvent by Zep
- NPB Heavy Duty Flux Remover

Your employer must tell you if you are working with 1-bromopropane, and must train you to use it safely. If you think you may be working with 1-BP, ask to see the Safety Data Sheets (SDSs) for the products you use. 1-BP is also called n-propyl bromide. The SDS for a product that contains 1-BP must identify it in Section 3, by the CAS number 106-94-5.

These are examples of common products that contain 1-BP. This is not a comprehensive list. Products like these can change their ingredients quite often. Be sure to check the most recent SDS for whatever products you are using.



1-BP is used in vapor degreasing to clean metal parts



1-BP is often used to clean electronics.



Spray aerosols used to clean auto parts may contain 1-BP

WHERE TO GET HELP

➤ **Hazard Evaluation System and Information Service**

(**HESIS**). HESIS answers questions about chemicals and other workplace hazards.

[HESIS website](http://www.cdph.ca.gov/hesis/) www.cdph.ca.gov/hesis/

510 620-5817 • (866) 282-5516 (toll free in California) Free publications on workplace health and safety topics.

510 620-5717 • (866) 627-1586 (toll free in California)

[HESIS publications on the web](http://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/Pages/Publications.aspx)

www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/Pages/Publications.aspx

➤ **Cal/OSHA - California Division of Occupational Safety and Health** sets and enforces workplace health and safety regulations (laws).

Talk to your employer if you think there is a health and safety problem at your job. If your employer does not fix the problem, you can call Cal/OSHA and file a complaint. Cal/OSHA will not tell your employer who made the call.

[Find a Cal/OSHA office that serves your location](http://www.dir.ca.gov/dosh/DistrictOffices.htm)

(www.dir.ca.gov/dosh/DistrictOffices.htm)

By phone, call 1-866-924-9757; press or say "2" for Cal/OSHA, then enter or say the zip code of your job site.

➤ **Cal/OSHA Consultation Services Branch** provides free assistance to employers to help them improve health and safety and comply with Cal/OSHA regulations.

(800) 963-9424 • InfoCons@dir.ca.gov

[Cal/OSHA Consultation Services Branch](http://www.dir.ca.gov/dosh/consultation_offices.html)

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

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

- UC San Francisco 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 • (858) 657-1600

➤ **To find a doctor** who specializes in work-related injury and illness: Search for "occupational medicine providers, your city name, CA" in [Google Maps](https://www.google.com/maps) (www.googlemaps.com) or another browser.

This hazard alert is an information alert from HESIS.

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