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Product Stewardship Summary

CAS: 106-94-5
Formula: $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{Br}$, $\text{C}_3\text{H}_7\text{Br}$

n-Propyl Bromide, 1-bromopropane, nPB

Table of Contents

Click a heading to display that topic.

- [Introduction](#)
- [Description and Properties](#)
- [Uses](#)
- [Health Information](#)
- [Exposure Potential](#)
- [Environmental Information](#)
- [Physical Hazards](#)
- [Derivation/Manufacturing](#)
- [Regulatory Information](#)
- [Product Stewardship](#)
- [Conclusion](#)
- [References](#)

Introduction

Manufacturers around the world rely on safe, efficient cleaners to remove oil and grease, soldering residue and other contaminants during manufacturing. Cleaner parts are more reliable and, in certain applications such as artificial joint implants and precision aerospace components, they are absolutely critical.

Solvents are essential tools in industrial cleaning, but scientists have discovered that some cleaners are harmful to the earth's ozone layer and may contribute to climate change. n-Propyl bromide (nPB) is a response to that concern. It is a nonflammable solvent that is highly effective, recyclable and more environmentally friendly.

n-Propyl bromide has other important applications, including use as an intermediate compound in the production of several important drugs.

Description and Properties

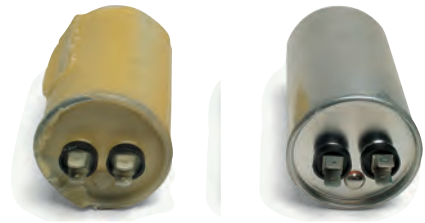
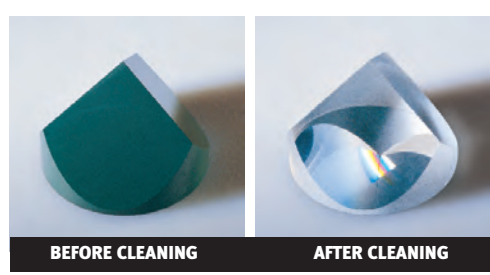
nPB is a clear, colorless to light-straw-colored liquid with a strong, sweet odor. This non-flammable organic solvent is the primary ingredient in Albemarle's ABZOL® cleaners.

These cleaners penetrate cracks and crevices well and dry quickly. They efficiently dissolve a variety of oils, waxes, greases and other materials, evaporate readily at moderate

temperatures, are compatible with most metals and are very easy to recycle. Although nPB reacts with water to form acidic compounds that can attack some unprotected metals, ABZOL cleaners are stabilized to prevent this.

Even so, contact with excessive moisture should be avoided.

Unlike many chlorine-containing compounds, nPB breaks down relatively quickly in the atmosphere, reducing its



impact on Earth's ozone layer. The US Environmental Protection Agency has determined that nPB has an atmospheric lifetime of just 16 days, and classifies its ozone depletion potential and global warming potential in North America as very low.

Uses

ABZOL cleaner's ability to dissolve wax, oils, greases and other hard-to-remove contaminants without breaking down makes it a very effective cleaning solvent. Thanks to its very low global warming potential, it has

become a popular replacement for other solvents that have been banned because of their potential harm to the environment.

ABZOL cleaner works very well in industrial cleaning equipment, such as vapor degreasers and ultrasonic systems. Manufacturers use it to clean metals, electronics, optical components and medical equipment, including implants such as artificial hip joints. It also is used to remove solder flux and other contaminants from circuit boards in aerospace applications and consumer electronics.

n-Propyl bromide is used as an intermediate in the production of insecticides, quaternary ammonium compounds, flavors and fragrances, and pharmaceutical mood stabilizers used to treat epilepsy, bipolar disorder and other psychiatric conditions.



Health Information

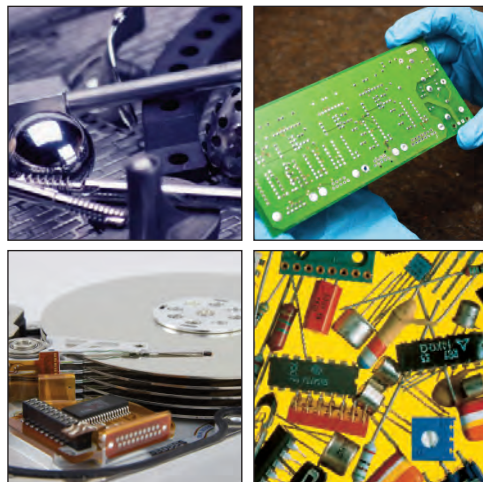
n-Propyl bromide exposure may irritate the nose, throat and lungs, but it is not expected to be acutely toxic by contact or ingestion. Excessive exposure may cause depression of the central nervous system (anesthetic-like effects). Doses high enough to cause such effects may also damage the liver and lungs.

The compound is expected to be an eye and skin irritant, and long-term overexposure may cause adverse effects in the liver, respiratory system, kidneys, reproductive system and central nervous system.

Exposure Potential

nPB evaporates readily and is repeatedly vaporized in cleaning equipment, so workers using nPB for parts cleaning are those most likely to be exposed by absorbing it through the skin or inhaling it. With this in mind, people who handle the compound should wear chemical-resistant goggles and gloves, and should use it only in well-ventilated areas. Aprons are advisable when splash protection is needed.

Workers who detect continuous strong odors should take corrective action to avoid further exposure. Albemarle's



suggested workplace exposure guideline for n-propyl bromide is 25 parts per million in air, and customers have found this to be achievable with proper engineering controls.

Environmental Information

n-Propyl bromide is not likely to accumulate in animal tissues, and the US Environmental Protection Agency (EPA) has found that it breaks down more quickly in the environment than alternative cleaning solvents and is therefore of low to moderate concern for movement in the soil. The agency describes aquatic toxicity as moderate, which is lower than the agency's findings for other cleaning compounds accepted under current environmental regulations. In light of this, nPB is not listed in the EPA's toxic release inventory.

Physical Hazards

nPB reacts with oxidizing agents or powdered aluminum to produce hazardous flammable compounds. It should be protected from moisture because it reacts with water to form acids. In addition to their potential health hazards, these acids can corrode or discolor steel, copper and other metals. Although not considered flammable, nPB can become combustible over a narrow range of concentrations, so it should not be exposed to sparks, flame or high-intensity heat.

Derivation/Manufacturing

Albemarle manufactures n-propyl bromide at its Magnolia, Arkansas, chemical manufacturing facility using propylene and hydrogen bromide.

Regulatory Information

Under the EPA's Significant New Alternatives Policy (SNAP) program, nPB is considered an acceptable substitute in certain applications for various chlorine-containing solvents that are considered ozone-depleting substances. The final rule lists n-propyl bromide as an acceptable substitute when used as a solvent in industrial equipment for metals cleaning, electronics cleaning or precision cleaning, including use in vapor degreasers, in-line cleaning systems or automated equipment used for cleaning below the solvent's boiling point.

n-Propyl bromide is not subject to regulation under SARA 313 (toxic release inventory) of the Emergency Planning and Community Right to Know Act, nor is it regulated under the National Emissions Standards for Hazardous Air Pollutants (NESHAP). It is not federally regulated as a Hazardous Air Pollutant and is not subject to regulation under the US Resource Conservation and Recovery Act (RCRA).

Some state regulations govern the use of nPB as a volatile organic compound in their efforts to meet National Ambient Air Quality Standards for ground-level ozone. Users located in areas that do not meet

these standards may be required to control their nPB emissions.

n-Propyl bromide has been pre-registered under the European Community Regulation "REACH." It is classified as non-hazardous for domestic and international shipment and is not considered a hazardous waste under RCRA. nPB that has been used as a solvent and does not contain other hazardous contaminants can be transported for disposal as a non-hazardous material.

Product Stewardship

Albemarle Corporation is committed to manage n-propyl bromide so that it can be safely distributed and used by our customers. We work with them to minimize the risks of leakage and personnel exposure by recommending appropriate containers and protective equipment, recommending exposure-monitoring procedures, and advocating very conservative workplace exposure guidelines.

Our goal is a safe and controlled system for the distribution and use of nPB in cleaning applications that protects public health and our environment. To that end, we encourage communication about safety

and environmental stewardship, and we are staffed and organized to investigate nPB-related incidents and recommend appropriate corrective action.

Conclusion

n-Propyl bromide is an extremely valuable cleaning product and an important intermediate used to make drugs for the treatment of emotional disturbances and mental illness. Delicate electronics, optics and medical equipment would be more difficult to make without nPB, but there

are even more important long-term advantages. nPB replaces hazardous chemicals that would otherwise cause far more damage to our environment by substantially increasing the risk of ozone depletion and global warming.



Note

This document provides general information about n-propyl bromide and does not supplant or replace required regulatory and/or legal communication documents, nor is it intended to provide an in-depth discussion of health and safety information. Always consult the product's material safety data sheet, product label and technical data sheet before using the chemical.

References

Albemarle n-Propyl Bromide Product Data Sheet

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