n-Propyl Bromide

Normal or n-propyl bromide (propyl bromide) is primarily used as a solvent in engineered cleaning applications or as a "building block" chemical where it is reacted with other chemicals in highly-controlled industrial settings to make other chemical products. Also known as 1-bromopropane, n-propyl bromide is made through a chemical reaction between n-propyl alcohol and hydrogen bromide. Propyl bromide is a clear liquid with a water-white appearance and a distinctive ethereal smell. It has strong solvent capabilities and readily cleans oils and other soils from machined metal parts. Propyl bromide can be safely used in industrial settings where engineering controls and personal protective equipment are used in concert with administrative controls to minimize exposure and prevent releases of the chemical. Propyl bromide should not be used in applications where vapors exceed the maximum recommended concentrations in air. Since n-propyl bromide sold by LANXESS Solutions US Inc. is an industrial chemical used only in industrial settings, the general public is unlikely to come into contact with this product.

Identification

The n-propyl bromide discussed in this product safety assessment can be identified by several names, all of them referring to the same chemical product. These names include:

- propyl bromide
- normal propyl bromide
- n-propyl bromide
- NPB
- CAS Number [106-95-5]
- bromopropane

It is important to recognize that another chemical named iso-propyl bromide (aka - IPB or 2-bromopropane) is sometimes also referred to as simply propyl bromide and is also available for use as a "building block" chemical. However, it is a different chemical with unique characteristics. In this product safety assessment, the use of the name propyl bromide refers only to n-propyl bromide.

Description

Production:

N-propyl bromide is made in a specialized manufacturing process. During production, hydrogen bromide and n-propyl alcohol are combined in chemical production units designed for the manufacture of chemicals. In its normal liquid state, n-propyl bromide is packaged in drums or bulk containers for distribution to the industrial sites where it will be utilized. Stabilizing chemicals are added to n-propyl bromide intended for use in cleaning applications to extend its useful life. The n-propyl bromide sold for use as a "building block" chemical does not contain any additives.

Uses:

The USEPA has granted n-propyl bromide approval for certain cleaning solvent and paint solvent uses to replace ozone depleting substances;, however, we do not sell directly to anyone for these uses. The stabilized form of n-propyl bromide marketed by LANXESS Solutions US Inc. is sold only to a highly specialized chemical distribution network that provides products to industrial companies that have invested in well-engineered parts cleaning systems. We work with our distribution network to ensure the stabilized n-propyl bromide that we supply is used only in applications where emissions and exposures are tightly controlled. Our standard version (non-stabilized) n-propyl bromide is only supplied to other chemical companies that make agricultural, pharmaceutical and industrial products that use it as a chemical intermediate (or "building block" chemical) to make other value added chemical products.

Properties:	Boiling Point:	71 °C
	Melting Point:	-110 °C
	Water Solubility:	0.25 g/100 g @ 20 °C

Potential Human Health Effects

Health Effects:

Propyl bromide is safe to use in industrial settings when proper handling protocols are followed and when handled in compliance with the recommended occupational exposure limit.

Propyl bromide is a very good solvent, so much so that skin contact with the liquid will result in the removal of oil and fats from the skin and could lead to irritation and cracking. Impervious gloves should be worn to

prevent skin contact in the industrial settings where propyl bromide is handled. Propyl bromide that is trapped against the skin can induce rashes or cause chemical burns.

Propyl bromide liquid and vapors can irritate the respiratory system and eyes. Direct splashes into the eyes can cause chemical burns, and eye protection should worn when handling propyl bromide.

Because n-propyl bromide readily forms vapors at ambient and elevated temperatures, inhalation is the most significant route of exposure. Though low concentrations of exposure to n-propyl bromide vapor can be tolerated, higher concentrations may lead to discomfort and result in coughing, wheezing or severe irritation of the nose, throat and respiratory tract. No odor threshold has been established for n-propyl bromide. If there is a noticeable odor, action should be taken to avoid exposure and evaluate the airborne concentration.

Individuals exposed to excessively high vapor concentrations of n-propyl bromide over extended time frames may experience damage to their nervous and reproductive systems. For this reason it is important that all safety recommendations for the handling of n-propyl bromide are followed at all times.

The stabilizers that are used to increase the longevity of n-propyl bromide used in solvent applications are designed to react readily with acids and other impurities that form during cleaning operations. These stabilizers exhibit hazardous characteristics. The safety data sheet for stabilized n-propyl bromide provides additional details of the stabilizers used and their toxicological properties.

Industrial Use:

Propyl bromide is used to manufacture widely diverse products and is sold only for use in highly controlled manufacturing facilities by people trained in the hazards of chemicals. N-propyl bromide used in a manufacturing setting should be handled using best practice techniques developed to minimize any potential risk of exposure to liquids and vapors. When n-propyl bromide is handled as a chemical intermediate, use sites typically utilize highly engineered systems to minimize the potential for exposure to all the chemicals used in the process. When used as a cleaning solvent, n-propyl bromide is sold for use only in well-engineered systems designed to minimize solvent emissions (example: modern vapor degreasing equipment). Unplanned releases or spills of n-propyl bromide, though serious, are not likely to represent a life-threatening situation, unless in an enclosed space with inadequate ventilation. In any spill or release incident, all non-essential

personnel are immediately evacuated upwind of the spilled material. All personnel involved with correcting a spill situation are trained and properly equipped with the required personal protective equipment.

Laboratory Use:

Because it is a building block chemical and its chemistry characteristics are well-understood, n-propyl bromide is regularly used in research laboratories in small quantities to develop new molecules. Similar to workers in an industrial setting, scientists use engineered systems, chemical training and specialized protective clothing when working with n-propyl bromide.

Consumer Use:

Because it is a building block chemical and its chemistry characteristics are well-understood, n-propyl bromide is regularly used in research laboratories in small quantities to develop new molecules. Similar to workers in an industrial setting, scientists use engineered systems, chemical training and specialized protective clothing when working with n-propyl bromide.

Environmental Release:

When used as a chemical intermediate, n-propyl bromide is handled using highly-engineered systems designed to minimize any release to the environment. When n-propyl bromide is transferred from one vessel to another, there is the potential for a small amount of the material to be released into the environment. However, because n-propyl bromide is a liquid at ambient temperatures and has a distinctive odor, leaks during transfer are readily observed and can be quickly corrected.

When used as a cleaning solvent, stabilized n-propyl bromide sold through our distribution network is used to fill closed industrial parts cleaning equipment including, for example, vapor degreasers. Modern vapor degreasers are engineered to minimize solvent emissions and to recover and extend the life of the solvent.

Propyl bromide that is released into the environment will readily evaporate, if spilled on a hard surface and will soak into soil or other porous materials. Propyl bromide that evaporates into the air has a relatively short life time and is believed to have fewer environmental impacts than the solvent it was designed to replace. Contained volumes of liquid n-propyl bromide can be collected in plastic or metal drums. Soils wetted with n-propyl bromide should be excavated and treated.

Physical Hazards

Propyl bromide is a clear, near water-white liquid that exhibits excellent solvent properties, making it highly effective at dissolving oils and additional soils from machined metals and other surfaces. It has a strong ethereal solvent odor. In some regions, n-propyl bromide is classified as non-flammable for transport purposes, because it does not have a flash point when tested using a standard industry protocol. In other regions, n-propyl bromide is transported as a flammable substance. However, regardless of the region, it is important to recognize that n-propyl bromide can burn when within specific concentrations in air. Propyl bromide can slowly react with water to form corrosive acids and is also reactive with certain metals, including aluminum and zinc. Under special controlled reaction conditions and in conjunction with other chemicals, n-propyl bromide is useful as a building block chemical to manufacture other value--added chemical products.

Potential Environmental Impact

Environmental Fate Information:

Propyl bromide will breakdown in all environmental compartments over time. The presence of moisture and sunlight speeds the breakdown. Propyl bromide has a very low Ozone Depleting Potential (ODP), especially in relation to the Ozone Depleting Substances (ODS) it can replace. This is why the EPA approved its use under their "Significant New Alternatives Program" (SNAP). When added to water, n-propyl bromide will form a distinct lower layer. Propyl bromide is only slightly soluble in water; but in the presence of water it will slowly react to form corrosive acids. When spilled on a hard impervious surface, n-propyl bromide will evaporate much more quickly than water would under the same circumstances.

Aquatic and/or Terrestrial Toxicity:

Releases of n-propyl bromide into the aquatic or terrestrial environment should be avoided. Large concentrations of n-propyl bromide maintained in an aquatic environment for extended periods of time could be expected to kill fish and other biota. Propyl bromide is biodegradable and not expected to bioaccumulate. Soils containing n-propyl bromide should be remediated to remove the chemical.

Product Stewardship

Manufacturing locations:

Facility management procedures, Safety Data Sheets (SDS), technical guidance documents, and training are available to communicate safe handling, risk mitigation measures and emergency response information

requirements to employees. All handling processes should be conducted indoors using closed systems to avoid emissions. Local exhaust ventilation should be used and piped to a scrubbing system to avoid release of vapors. Operators should wear personal protective equipment including gloves, safety glasses with side shields and vapor filter respiratory protection.

Environment:

When n-propyl bromide is used as a chemical intermediate it is destroyed during use. Systems that use n-propyl bromide as an industrial cleaning solvent or an industrial intermediate control the potential for air emissions using suitable air pollution control equipment and procedures. If n-propyl bromide is released into the environment in excessive amounts, the area should be evacuated, and hazardous materials professionals must be called to manage the situation and monitor the resulting vapors that form.

Consumers:

Consumers are not exposed to n-propyl bromide distributed by LANXESS Solutions US Inc., because we do not sell directly to consumers nor endorse sales to consumer markets.

LANXESS Solutions US Inc. conducts ongoing analysis of its products to evaluate potential risk areas throughout the product's life cycle. Chemical risks are identified at the very early stage of new product development. They are evaluated by stage-gated reviews using environmental, health and safety (EHS) criteria. The analysis of existing products will evaluate raw materials, manufacturing, transportation, customer end-use and disposal. Additionally, before changes in existing product formulations are made, a detailed evaluation is made of the proposed change. A critical component of all of these processes is the Safety Data Sheet, which lists detailed product hazard information.

In the context of a continually improving risk-reduction program, periodic reviews of current controls occur in order to identify opportunities for improvements or enhancements. This includes adaption of existing procedures to changes in regulations (e.g., covering workplace and transportation).

Conclusion

Propyl bromide is a unique substance with a wide variety of uses in manufacturing. Though there are potential hazards associated with the material, it is only handled by highly trained people in manufacturing environments utilizing specialty equipment, safety controls, and personal protective equipment.

Contact Information

LANXESS Solutions US Inc.

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Notices

Use and Application Information

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.