

Material Safety Data Sheet



N-Pentane

Section 1. Chemical product and company identification

Product name	: N-Pentane
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Synonym	: n-PENTANE
Material uses	: Other non-specified industry: ARTIFICIAL ICE MANUFACTURE; LOW-TEMPERATURE THERMOMETERS; SOLVENT EXTRACTION PROCESSES; BLOWING AGENT IN PLASTICS, E.G., EXPANDABLE POLYSTYRENE; PESTICIDE.
MSDS #	: 001133
Date of Preparation/ Revision	: 4/23/2014.
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Liquid. [COLORLESS LIQUID WITH A GASOLINE-LIKE ODOR [NOTE: A GAS ABOVE 97 F. MAY BE UTILIZED AS A FUEL.]]
Emergency overview	: DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. FLAMMABLE. VAPOR MAY CAUSE FLASH FIRE. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. Extremely flammable liquid. Keep away from heat, sparks and flame. Avoid breathing vapor or mist. Avoid contact with skin and clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use.
Target organs	: May cause damage to the following organs: lungs, peripheral nervous system, upper respiratory tract, skin, eyes, central nervous system (CNS).
Potential acute health effects	
Eyes	: May cause eye irritation.
Skin	: May cause skin irritation.
Inhalation	: No known significant effects or critical hazards.
Ingestion	: No known significant effects or critical hazards.
Potential chronic health effects	
Chronic effects	: May cause target organ damage, based on animal data.
Target organs	: May cause damage to the following organs: lungs, peripheral nervous system, upper respiratory tract, skin, eyes, central nervous system (CNS).
Medical conditions aggravated by over-exposure	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

United States

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
pentane	109-66-0	100	ACGIH TLV (United States, 3/2012). TWA: 600 ppm 8 hours. NIOSH REL (United States, 1/2013). CEIL: 1800 mg/m ³ 15 minutes. CEIL: 610 ppm 15 minutes. TWA: 350 mg/m ³ 10 hours. TWA: 120 ppm 10 hours. OSHA PEL (United States, 6/2010). TWA: 2950 mg/m ³ 8 hours. TWA: 1000 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). STEL: 2250 mg/m ³ 15 minutes. STEL: 750 ppm 15 minutes. TWA: 1800 mg/m ³ 8 hours. TWA: 600 ppm 8 hours.

Section 4. First aid measures

Eye contact	: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
Skin contact	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
Inhalation	: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Ingestion	: Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Section 5. Fire-fighting measures

Flammability of the product	: Flammable.
Auto-ignition temperature	: 260°C (500°F)
Flash point	: Closed cup: <-40°C (<-40°F).
Flammable limits	: Lower: 1.5% Upper: 7.8%
Products of combustion	: Decomposition products may include the following materials: carbon dioxide carbon monoxide

Extinguishing media

Suitable	: Use dry chemical, CO ₂ , water spray (fog) or foam.
Not suitable	: Do not use water jet.
Special exposure hazards	: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.
Special protective equipment for fire-fighters	: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Methods for cleaning up** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.
- Engineering measures** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

N-Pentane

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.
Appropriate techniques should be used to remove potentially contaminated clothing.
Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
When there is a risk of ignition from static electricity, wear anti-static protective clothing.
For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

Exposure limits

United States

pentane

ACGIH TLV (United States, 3/2012).

TWA: 600 ppm 8 hours.

NIOSH REL (United States, 1/2013).

CEIL: 1800 mg/m³ 15 minutes.

CEIL: 610 ppm 15 minutes.

TWA: 350 mg/m³ 10 hours.

TWA: 120 ppm 10 hours.

OSHA PEL (United States, 6/2010).

TWA: 2950 mg/m³ 8 hours.

TWA: 1000 ppm 8 hours.

OSHA PEL 1989 (United States, 3/1989).

STEL: 2250 mg/m³ 15 minutes.

STEL: 750 ppm 15 minutes.

TWA: 1800 mg/m³ 8 hours.

TWA: 600 ppm 8 hours.

Section 9. Physical and chemical properties

Physical state : Liquid. [COLORLESS LIQUID WITH A GASOLINE-LIKE ODOR [NOTE: A GAS ABOVE 97 F. MAY BE UTILIZED AS A FUEL.]]

Color : Colorless.

Odor : Characteristic.

Molecular weight : 72.15 g/mole

Molecular formula : C5-H12

Boiling/condensation point : 36.06°C (96.9°F)

Melting/freezing point : -129.67°C (-201.4°F)

Critical temperature : 196.55°C (385.8°F)

Specific gravity : 0.63 (Water = 1)

***N*-Pentane**

Vapor pressure	: 8.6 psia
Vapor density	: 2.5 (Air = 1)
Evaporation rate	: 10.46 compared with butyl acetate
VOC	: 100 % (w/w)
Viscosity	: Dynamic: 0.224 cP
LogK_{ow}	: The product is more soluble in octanol; log(octanol/water) = 3.45

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
pentane	LC50 Inhalation Vapor	Rat	364 g/m ³	4 hours

IDLH	: 1500 ppm
Chronic effects on humans	: May cause damage to the following organs: lungs, peripheral nervous system, upper respiratory tract, skin, eyes, central nervous system (CNS).
Other toxic effects on humans	: No specific information is available in our database regarding the other toxic effects of this material to humans.
<u>Specific effects</u>	
Carcinogenic effects	: No known significant effects or critical hazards.
Mutagenic effects	: No known significant effects or critical hazards.
Reproduction toxicity	: No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation	: Products of degradation: carbon oxides (CO, CO ₂) and water.
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Section 13. Disposal considerations

Waste disposal	: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
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Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1265	N-Pentane	3	II		-
TDG Classification	UN1265	N-Pentane	3	II		<u>Explosive Limit and Limited Quantity Index</u> 1 <u>Passenger Carrying Ship Index</u> Forbidden <u>Passenger Carrying Road or Rail Index</u> 5
Mexico Classification	UN1265	N-Pentane	3	II		-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Section 15. Regulatory information

United States

- HCS Classification** : Flammable liquid
Target organ effects
- U.S. Federal regulations** : **TSCA 8(a) PAIR:** pentane
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): This material is listed or exempted.
TSCA 12(b) one-time export: pentane
SARA 302/304: No products were found.
SARA 311/312 Hazards identification: Fire hazard, Delayed (chronic) health hazard
Clean Air Act (CAA) 112 accidental release prevention - Flammable Substances:
 N-Pentane

Clean Air Act (CAA) 112 regulated flammable substances: pentane

- State regulations** : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.

N-Pentane

New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada)

: Class B-2: Flammable liquid
CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

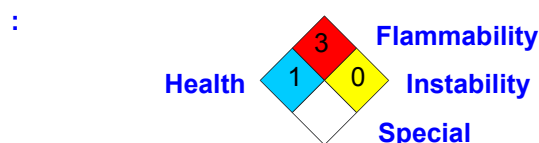
Label requirements

: EXTREMELY FLAMMABLE LIQUID AND VAPOR. FLAMMABLE. VAPOR MAY CAUSE FLASH FIRE. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.)

Health	1
Flammability	3
Physical hazards	1

National Fire Protection Association (U.S.A.)



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.