1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY/UNDERTAKING

Identification of the substance/preparation	:	Pentane
Chemical formula	:	C5H12
Other means of identification	:	n-Pentane
Use of the Substance/Mixture	:	General Industrial. Industrial and professional use.
Restrictions on Use	:	No data available.
Manufacturer/Importer/Distributor	:	Air Products Singapore Industrial Gases Pte. Ltd. 2 International Business Park The Strategy, #03-20 Singapore 609930 Toll Free No: 800 448 1755
Email Address – Technical Information	:	GASTECH@airproducts.com
Telephone	:	6332 2440
Emergency telephone number (24h)	:	+65 6853 6800 +1 610 481 7711 International

2. HAZARDS IDENTIFICATION

GHS classification

Flammable liquids - Category 2
Aspiration hazard - Category 1
Specific target organ toxicity - single exposure - Category 3
Chronic aquatic toxicity - Category 2

GHS label elements

Hazard pictograms/symbols

Signal Word: Danger

Hazard Statements:

H225:Highly flammable liquid and vapour.
H304:May be fatal if swallowed and enters airways.

H336:May cause drowsiness or dizziness.
H411:Toxic to aquatic life with long lasting effects.
EUH066:Repeated exposure may cause skin dryness or cracking.

Precautionary Statements:

Prevention : P210:Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.
P233:Keep container tightly closed.
P261:Avoid breathing dust/fume/gas/mist/vapours/spray.

Response : P301+P310 :IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P331 :Do NOT induce vomiting.
P370+P378 :In case of fire, use recommended extinguishing media for extinction.

Other hazards which do not result in classification

Flammable.
May form explosive mixtures in air.

Environmental Effects

Dangerous for the environment.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Mixture : Substance

Components	Chemical formula	CAS Number	Concentration (Volume)
n-pentane	C5H12	109-66-0	100 %

Concentration is nominal. For the exact product composition, please refer to technical specifications.

4. FIRST AID MEASURES

General advice : Remove victim to uncontaminated area.

Eye contact : Rinse immediately with plenty of water and seek medical advice.

Skin contact : Wash off immediately with plenty of water for at least 20 minutes.

Ingestion : Do not induce vomiting. Call a physician immediately. If accidentally swallowed obtain immediate medical attention.

Inhalation : Move to fresh air. In case of shortness of breath, give oxygen.

Notes to physician

Treatment : If exposed or concerned: Get medical attention/advice.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Shutting off the source of the gas is the preferred method of control.
Foam.

Dry chemical.
Be aware of the risk of formation of static electricity with the use of CO2 extinguishers and do not use them in places where a flammable atmosphere may be present.

Extinguishing media which must not be used for safety reasons.	:	Do not use water jet to extinguish.
Specific hazards	:	Move away from container and cool with water from a protected position. Keep adjacent cylinders cool by spraying with large amounts of water until fire burns itself out. Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Combustion by-products may be toxic. Ignitable by static electricity.
Special protective equipment for fire-fighters	:	In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate personnel to safe areas. Remove all sources of ignition. Never enter a confined space or other area where the flammable gas concentration is greater the 10% of its lower flammable limit. Ventilate the area. Do not walk on or roll equipment over spills. Protect eyes, face and skin from liquid splashes.
Environmental precautions	:	Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Avoid subsoil penetration. Do not flush into surface water or sanitary sewer system.
Methods for cleaning up	:	Ventilate the area. Approach suspected leak areas with caution. Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.
Additional advice	:	Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Absorb excess liquid spillage on inorganic adsorbent material such as fine sand, brick dust etc. Place spent adsorbent in sealed packages and contact specialist waste disposal contractor.

7. HANDLING AND STORAGE

Handling

Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system has been checked for leaks before use. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shock. Never attempt to lift a cylinder by its

valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Do not smoke while handling product or cylinders. Always use backflow protective device in piping. Purge air from system before introducing gas. When returning cylinder install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F). Ensure equipment is adequately earthed.

Storage

Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Observe all regulations and local requirements regarding storage of containers. Stored containers should be periodically checked for general condition and leakage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Smoking should be prohibited within storage areas or while handling product or containers. Display "No Smoking or Open Flames" signs in the storage areas. Return empty containers in a timely manner. Keep away from heat.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance whit local regulations. Keep away from combustible material. All electrical equipment in the storage areas should be compatible with flammable materials stored. Containers containing flammable gases should be stored away from other combustible materials. Where necessary containers containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or explosion-proof ventilation that is adequate to ensure flammable gas does not reach its lower explosive limit.

Personal protective equipment

Respiratory protection	:	High concentrations that can cause rapid suffocation are within the flammable range and should not be entered. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Hand protection	:	Wear work gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk.
Eye protection	:	Safety glasses recommended when handling cylinders. Standard EN 166 - Personal eye-protection.
Skin and body protection	:	Consider the use of flame resistant anti-static safety clothing. Standard EN ISO 14116 - Limited flame spread materials. Standard EN ISO 1149-5 - Protective clothing: Electrostatic properties. Safety shoes are recommended when handling cylinders. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
Special instructions for protection and hygiene	:	Ensure adequate ventilation, especially in confined areas.

Exposure limit(s)

n-pentane	Time Weighted Average (TWA): EH40 WEL	600 ppm	1,800 mg/m3
n-pentane	Time Weighted Average (TWA): EU ELV	1,000 ppm	3,000 mg/m3
n-pentane	Time Weighted Average (TWA): EU SCOELS	1,000 ppm	3,000 mg/m3

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid. Colorless.
Odor	:	Petroleum-like. Poor warning properties at low concentrations.
Odor threshold	:	No data available.
pH	:	No data available.
Melting point/range	:	-202 °F (-130 °C)
Boiling point/range	:	97 °F (36 °C) at 11.02 psia (0.76 bara)
Flash point	:	-56 °F (-49 °C)
Evaporation rate	:	No data available.
Flammability (solid, gas)	:	Not applicable.
Upper/lower explosion/flammability limit	:	8 %(V) / 1.4 %(V)
Vapor pressure	:	8.31 psia (0.57 bara) at 68 °F (20 °C)
Water solubility	:	Not known, but considered to have low solubility.
Relative vapor density	:	2.48 (air = 1)
Relative density	:	0.626 (water = 1)
Partition coefficient: n-octanol/water [log Kow]	:	No data available.
Auto-ignition temperature	:	260 °C
Decomposition temperature	:	No data available.
Viscosity	:	0.25 mPa.s at 68 °F (20 °C)
Molecular Weight	:	72.15 g/mol
Density	:	39.080 lb/ft3 (0.626 g/cm3)

10. STABILITY AND REACTIVITY

Chemical Stability	:	Stable under normal conditions.
Conditions to avoid	:	Heat, flames and sparks. May form explosive mixtures with air and oxidizing agents.
Reactivity/Incompatible Materials	:	Oxygen. Oxidizing agents.
Hazardous decomposition products	:	Incomplete combustion may form carbon monoxide.

11. TOXICOLOGICAL INFORMATION

Likely routes of exposure

Effects on Eye	:	Causes eye irritation. May cause eye irritation.
Effects on Skin	:	Causes skin irritation. May cause skin irritation.
Inhalation Effects	:	May cause headache and dizziness. May cause irritation of respiratory tract. Causes headache, drowsiness or other effects to the central nervous system. In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.
Ingestion Effects	:	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.Aspiration hazard if swallowed - can enter lungs and cause damage.Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
Symptoms	:	No data available.

Acute toxicity

Acute Oral Toxicity	:	LD50 : > 2.000 mg/kg Species : Rat.
Inhalation	:	LC50 (4 h) : 364 mg/l Species : Rat.
Acute Dermal Toxicity	:	No data is available on the product itself.
Serious eye damage/eye irritation	:	No data available.
Sensitization.	:	No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity	:	No data available.
Reproductive toxicity	:	No data is available on the product itself.
Germ cell mutagenicity	:	No data is available on the product itself.

Specific target organ systemic toxicity (single exposure)	:	No data available.
Specific target organ systemic toxicity (repeated exposure)	:	No data available.
Aspiration hazard	:	May be fatal if swallowed and enters airways.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity	:	No data is available on the product itself.
Toxicity to other organisms	:	No data available.

Persistence and degradability

Biodegradability	:	No data is available on the product itself.
Mobility	:	Because of its high volatility, the product is unlikely to cause ground pollution.
Bioaccumulation	:	Refer to Section 9 "Partition Coefficient (n-octanol/water)".

Further information

Toxic to aquatic organisms. Endangering to drinking water.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	:	Contact supplier if guidance is required. Return unused product in original cylinder to supplier. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Refer to the EIGA code of practice Doc. 30 "Disposal of Gases", downloadable at http://www.eiga.org for more guidance on suitable disposal methods. List of hazardous waste codes: 16 05 04*: gases in pressure containers (including halons) containing hazardous substances.
Contaminated packaging	:	Return cylinder to supplier.

14. TRANSPORT INFORMATION

ADR

UN/ID No.	:	UN1265
Proper shipping name	:	PENTANES
Class or Division	:	3
Packing group	:	II
Tunnel Code	:	(D/E)
Label(s)	:	3
ADR/RID Hazard ID no.	:	33
Marine Pollutant	:	Yes

** NOTE: This product contains a substance that: 1) is regulated as a Marine Pollutant, or 2) meets the definition

of toxic to the aquatic environment.

IATA

UN/ID No.	:	UN1265
Proper shipping name	:	Pentanes
Class or Division	:	3
Packing group	:	II
Label(s)	:	3
Marine Pollutant	:	Yes

** NOTE: This product contains a substance that: 1) is regulated as a Marine Pollutant, or 2) meets the definition of toxic to the aquatic environment.

IMDG

UN/ID No.	:	UN1265
Proper shipping name	:	PENTANES, LIQUID
Class or Division	:	3
Packing group	:	II
Label(s)	:	3
Marine Pollutant	:	Yes
Segregation Group	:	None

** NOTE: This product contains a substance that: 1) is regulated as a Marine Pollutant, or 2) meets the definition of toxic to the aquatic environment.

RID

UN/ID No.	:	UN1265
Proper shipping name	:	PENTANES
Class or Division	:	3
Packing group	:	II
Label(s)	:	3
Marine Pollutant	:	Yes

** NOTE: This product contains a substance that: 1) is regulated as a Marine Pollutant, or 2) meets the definition of toxic to the aquatic environment.

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

15. REGULATORY INFORMATION

Workplace Safety and Health Act & Workplace Safety and Health (General Provisions) Regulations

Workplace Health and Safety Act , SS586 Labeling.

Flammable Materials Regulation Licensable Chemicals (Singapore Civil Defense Force).

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.

EU	EINECS	Included on Inventory.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

16. OTHER INFORMATION

Ensure all national/local regulations are observed.

Prepared by : Air Products and Chemicals, Inc. Global EH&S Department

For additional information, please visit our web site at http://www.airproducts.com