

**MATERIAL SAFETY DATA SHEET (MSDS)****BUTADIENE****1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

SUBSTANCE OR PREPARATION TRADE NAME	Butadiene
CHEMICAL CLASSIFICATION	Hydrocarbon
COMPANY/ UNDERTAKING NAME AND ADDRESS	Haldia Petrochemicals Limited, PO Box No 12, Haldia Plant PO Durgachak, Dist Midnapore West Bengal, India PIN 721 602
TELEPHONE	091-3224-274384 / 274400
EMERGENCY TELEPHONE NUMBER	091-3224-275916

2. COMPOSITION AND INFORMATION ON INGREDIENTS


CHEMICAL NAME	CHEMICAL FORMULA	CONTENT	CAS NUMBER	EXPOSURE LIMITS IN AIR (ppm)		
				ACGIH TLV-TWA	OSHA PEL STEL	IDLH
1,3 Butadiene	C ₄ H ₆	>99.5 wt%	106-99-0	2	5	2000
Total Acetylenes as vinyl acetylene		40 max wppm				
Vinyl acetylene	C ₄ H ₄	5 max wppm	689-97-4			
Carbonyl as acetaldehyde		20 max wppm				
Peroxide as H ₂ O ₂		2 max wppm				
Solvent NMP	C ₅ H ₉ NO	10 max wppm	872-50-4			
1,2 Butadiene	C ₄ H ₆	20 max wppm	590-19-2			
Other C ₄ 's		0.5 max wppm	Mixture			
C ₅ Hydrocarbons		10 max wppm	Mixture			
BD dimer		250 max wppm				
TBC as loaded	C ₁₀ H ₁₄ O ₂	100-150 max wppm	98-29-3			
Sulfur		10 max wppm				
Propadiene	C ₃ H ₄	10 max wppm	463-49-0			
Methyl acetylene	C ₃ H ₄	5 max wppm	74-99-7			

3. HAZARD CLASSIFICATION

EMERGENCY OVERVIEW	It is colourless, extremely flammable gas, varnish
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		<p>like odour. This gas acts as an asphyxiant and presents a significant health hazard by displacing oxygen in the atmosphere. It cause frostbite to any contaminated tissue, it is a suspected human carcinogen and suspect reproductive toxin. The gas is heavier than air and may spread long distances. Distant ignition and flashback are possible. 1.3-butadiene can undergo a violent chemical reaction at elevated temperatures. Provide adequate fire protection during emergency response situations</p>			
POTENTIAL HEALTH HAZARDS					
ACUTE	EYE	SKIN	INHALATION	INGESTION	OTHERS
	Exposure to very high concentration of 2000-4000ppm causes Eye irritation and blurred vision	Skin contact of very high concentrations can irritate the skin. Frostbite from direct contact with liquid.	Harmful by inhalation. Inhalation of 1,3 butadiene is a mild CNS depressant in humans at low concentration. At very high concentration, it causes CNS depression leading to respiratory paralysis and death.	Since the product is a gas and that it is mostly probable that will be inhaled more than ingested	It can cause asphyxiation by displacement of air.
CHRONIC	Proven human carcinogen by NIOSH & EU. Suspected for human by ACGIH. Dermatitis (irritation and reddening of skin)				
NFPA HAZARD SIGNALS		HEALTH	FLAMMABILITY	REACTIVITY	SPECIAL
		2	4	2	-
HAZCHEM CODE	2WE				
Classification (GHS-US)	Flammable gases Category 1 Gases under pressure Compressed gas Germ cell mutagenicity Category 1B Carcinogenicity Category 1A Specific target organ toxicity (single exposure) Category 3 - Respiratory irritation Specific target organ toxicity (repeated exposure) Category 1				
GHS-US labeling Hazard pictograms (GHS-US)					
Signal word (GHS-US)	Danger				
Hazard statements (GHS-US)	H220 - EXTREMELY FLAMMABLE GAS H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED H340 - MAY CAUSE GENETIC DEFECTS H350 - MAY CAUSE CANCER (Inhalation) CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR CGA-HG01 - MAY CAUSE FROSTBITE.				
Precautionary statements	P201 - Obtain special instructions before use				
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(GHS-US)	<p>P202 - Do not handle until all safety precautions have been read and understood</p> <p>P210 - Keep away from heat, Open flames, sparks, hot surfaces. - No smoking</p> <p>P261 - Avoid breathing gas</p> <p>P262 - Do not get in eyes, on skin, or on clothing.</p> <p>P271+P403 - Use and store only outdoors or in a well-ventilated place.</p> <p>P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection.</p> <p>P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely</p> <p>P381 - Eliminate all ignition sources if safe to do so</p> <p>P405 - Store locked up</p> <p>P501 - Dispose of contents/container in accordance with container supplier/owner instructions</p> <p>CGA-PG05 - Use a back flow preventive device in the piping.</p> <p>CGA-PG12 - Do not open valve until connected to equipment prepared for use.</p> <p>CGA-PG06 - Close valve after each use and when empty.</p> <p>CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).</p>
Hazards not otherwise classified	Other hazards not contributing to the classification : Elevated temperatures can cause hazardous polymerization. If the polymerization takes place in a container, there is a possibility of violent rupture of the container.
Unknown acute toxicity (GHS-US)	Not applicable
Additional information	Based on conditions common to industrial workplace use of this product: Contact with the liquefied gas may cause frostbite. Based on professional judgment, inconclusive testing, or sensitive individuals: May cause mild eye irritation.

4. FIRST AID MEASURES

SKIN CONTACT	Wash affected skin with water at least 15 minutes with running water, apply xylocame or antibiotic cream locally
EYE CONTACT	Flush eyes with plenty of running water for at least 15 minutes
INHALATION	Remove the victim to fresh air. Give artificial respiration, if breathing has stopped obtain medial attention immediately
INGESTION	Since the product is a gas and that is mostly probable that it will be inhaled more than ingested.
OTHER INSTRUCTIONS	

5. FIRE FIGHTING MEASURES

FLASH POINT	-76 ⁰ C (closed cup)
AUTO IGNITION TEMP	420 ⁰ C
FLAMMABLE LIMITS IN AIR BY VOL%	LEL%: 2.0, UEL%: 11.5
FIRE EXTINGUISHING AGENTS AND SPECIAL PROCEDURES	Dry chemical, co2, foam, steam, water fog
UNUSUAL FIRE AND EXPLOSION HAZARDS	1,3 Butadiene can irritate the eyes, nose, and throat and presents a moderate hazard to fire fighters. Extremely flammable in presence of open flames, sparks and static discharge, of heat,

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	of oxidizing materials. Loss of inhibitor from excessive heat or long-term storage may cause spontaneous polymerisation within the container and it may rupture due to explosion.
SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS	Self contained breathing apparatus and full protective equipment

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS	Trained personnel using preplanned procedures should respond to uncontrolled releases. Proper protective equipment should be used.
ENVIRONMENTAL PRECAUTIONS	Let evaporate. If possible, turn leaking container so that gas escapes rather than liquid. Do not direct water at spill or source's water spray curtain to divert vapour drift. Prevent entry into sewers, basements or confined areas. Eliminate all ignition sources
METHOD OF CLEANING	If liquid 1,3 butadiene is spilled or leaked absorb in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.

7. HANDLING AND STORAGE

HANDLING	Wash thoroughly after handling, remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin and clothing
STORAGE	Store in a cool, fire proof with ventilation along the ground. keep away from heat, sparks, open flame and incompatible materials

8. EXPOSURE CONTROLS-PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROL	Adequate ventilation to keep air borne concentrations low. Local exhaust ventilation is preferred. Facilities and storing or utilizing this material should be equipped with an eye wash facility and safety shower. Install automatic monitoring equipment to detect the presence of potentially explosive air gas mixture and the level of oxygen.		
OTHER CONTROL PARAMETERS	Maintain Oxygen Level Above 19.5%		
PERSONAL PROTECTION EQUIPMENT			
EYE/ FACE PROTECTION	RESPIRATORY PROTECTION	HAND PROTECTION	BODY PROTECTION
Splash goggles, face shield or safety glasses for protection from rapidly expanding gases and splashes of liquid.	Self-contained breathing apparatus (SCBA), supplied air respirator (SAR). Full face piece respirator (gas mask)	Butyl or viton gloves are recommended when handling containers of liquid butadiene. Use of low temperature protective gloves (e.g Kevlar)	Flame retardant clothing covering the entire body

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	ODOUR	PHYSICAL STATE	BOILING POINT
Colourless	Mild aromatic	Gas	-4.5 ⁰ C
MELTING /	SPECIFIC GRAVITY	PH	SOLUBILITY IN
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FREEZING POINT	(AT 20 ⁰ C) (WATER=1)		WATER (AT 30 ⁰ C)
-109 ⁰ C	0.621	NA	Not Soluble
VAPOUR PRESSURE (AT 20 ⁰ C) IN MM Hg	VAPOUR DENSITY (AIR=1)	OTHER INFORMATIONS	VISCOSITY
1840	1.87		NA

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID	Contact with incompatible materials and exposure to heat, sparks, sources of ignition
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE	Strong acids and strong bases, oxidizers, organic compounds, boron -trifluoride, phenol, aluminium tetrahydroborate
HAZARDOUS DECOMPOSITION PRODUCTS	Carbon monoxide, carbon dioxide, organic peroxides
HAZARDOUS POLYMERIZATION	At elevated temperatures, polymerisation may occur with rapid release of pressure and heat

11. TOXICOLOGICAL INFORMATION

ANIMAL TOXICITY DATA	
ORAL LD50 (rat): 5480 mg/kg	DERMAL LD50 (rabbit): mg/kg
IRRITANCY OF PRODUCT	Contact with rapidly expanding gases can cause frostbite to exposed tissues
REPRODUCTIVE TOXICITY INFORMATION	
REPRODUCTIVE TOXICITY	No adverse reproductive toxicity effects on humans have been described
MUTAGENICITY	Effect in blood cells of person occupationally exposed to butadiene, butadiene and its metabolites have exhibited mutagenicity in bacterial test system
EMBRYOTOXICITY	Butadiene has not been reported to cause embryotoxic. Reduced body weight has been observed in studies
TERATOGENICITY	No human teratogenicity effects

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY	Gas will be dissipated in well ventilated areas
EFFECT OF MATERIAL ON PLANTS OR ANIMALS	Adverse effect on animals would be related to oxygen deficient environments
EFFECT OF CHEMICAL ON AQUATIC LIFE	Adverse effect on aquatic life if released to an aquatic environment

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS	Product removed from the cylinder must be disposed of in accordance with appropriate U.S federal, state and local regulations
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	PROPER SHIPPING NAME	HAZARD CLASS	IDENTIFICATION NUMBER	PACKING GROUP	LABEL REQUIRED
DOT	BUTADIENE	2.1	UN 1010	NA	Flammable Gas
TDG	BUTADIENE	2.1	UN 1010	NA	Flammable Gas
IMDG/ICAO	BUTADIENE	2.1	UN 1010	-	-

15. REGULATORY INFORMATION

INDIAN REGULATION		
INTERNATIONAL REGULATIONS		
EU CLASSIFICATION	RISK PHRASES	Class 45-13
	SAFETY PHRASES	Class 53-9-16-33
WHMIS CLASSIFICATION	Class A: compressed gas, Class B-1: Flammable gas, Class D-2A: material causing other toxic effects (very toxic)	
OSHA CLASSIFICATION	Material not listed in appendix A of 29CFR 1910.119 as highly hazardous chemicals	

16. OTHER INFORMATION

DISCLAIMER	Information contained in this material safety data sheet is believed to be reliable but no representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. It is up to the user/ distributor to ensure that the information contained in the material safety data sheet is relevant to the product manufactured/ handled or sold by him as the case may be. HPL makes no warranties, expressed or implied, in respect of the adequacy of this document for any particular purpose.
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