

GAS INNOVATIONS

MATERIAL SAFETY DATA SHEET (MSDS)

BUTADIENE

PRODUCT IDENTIFICATION

▪D.O.T. SHIPPING NAME	Butadiene, Stabilized
▪SYNONYM (S)	1-3 Butadiene, Vinylethylene, Biethylene, Erythrene, Bivynl, Divynl B
▪D.O.T. I.D. NUMBER	UN-1010
▪D.O.T. HAZZARD CLASS	2.1 Flammable Gas
▪D.O.T. LABEL (S)	Flammable Gas
▪C.A.S. NUMBER	106-99-0
▪CHEMICAL FORMULA	C ₄ H ₆ or H ₂ C:CHCH:CH ₂ or CH ₂ :CHCH:CH ₂

PHYSICAL DATA

▪MOLECULAR WEIGHT	54.092
▪FREEZING POINT	-108.9°C, -164.0°F
▪BOILING POINT	-3.9°C, 25°F
▪VAPOR PRESSURE	25 PSIA @ 50°F, 8.4 PSIA @ 0°F
▪SPECIFIC VOLUME	6.9ft ³ /lb @ 1atm, 70°F
▪SPECIFIC GRAVITY	0.63 @ 60°F
▪SPECIFIC GRAVITY OF VAPOR (Air=1)	1.88 @ 1 atm, 15.5°C
▪EVAPORATION RATE n-Bu Acetate=1	Not Available
▪VISCOSITY OF LIQUID	0.4 cst @ 0°F
▪RELATIVE DENSITY, (air=1)	1.9153 @ 1 atm, 60°F
▪SOLUBILITY IN WATER	0.07% @ 100°F
▪DESCRIPTION	At room temperature and atmospheric pressure 1,3-butadiene is a colorless, flammable gas, with a mildly aromatic odor. It is shipped as a liquefied gas under its own vapor pressure.

FIRE AND EXPLOSION HAZARD DATA

▪FLAMMABLE LIMITS IN AIR	2.0 – 12.0% by volume
▪AUTO-IGNITION TEMPERATURE	435°C, 815.0°F
▪FLASHPOINT	<0°F METHOD: ASTM D56

Date prepared: September 7, 2007

▪ FIRE FIGHTING
PROCEDURES

The only safe way to extinguish an 1,3-butadiene fire is to stop the flow of gas. If the flow cannot be stopped, let the fire burn out while cooling the cylinder and the surroundings using a water spray. Personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus. Firefighters' turnout gear may be inadequate. Small secondary fires may be brought under control by using carbon dioxide or a dry chemical fire extinguisher and stopping the flow. Cover liquid spills with foam. If a leak or spill has not ignited, use water spray to disperse the vapors. Do not extinguish flames at leak because possibility of uncontrolled explosive reignition exists.

▪ UNUSUAL HAZARDS

Unstable, material will vigorously polymerize, decompose, condense or will become self-reactive under conditions of shocks of pressure or temperature. Static discharge, material can accumulate static charges which can cause an incendiary electrical discharge. Auto-refrigeration, drains can become plugged and valves may be come in operable because of the formation of ice due to expanding vapors or vaporizing liquids.

1. Cylinders exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool by applying water from a maximum possible distance with a water spray.
2. Flammable gases may spread from a spill after the fire is extinguished and be subject to re-ignition.
3. Butadiene may form explosive peroxides on exposure to air in storage.
4. See Section6, Reactivity Data.

HEALTH HAZARD DATA

▪ PERMISSIBLE EXPOSURE
LIMITS

OSHA TWA 1ppm (2.2 mg/m³)
ASGIH TWA 2 ppm (4.4 mg/m³)*
ACGIH STEL 5 ppm (11 mg/m³)*
ACGIH considers 1,3 – butadiene to be a suspected carcinogen and has recommended a TWA of 2 ppm (4.4 mg/m³).

NIOSH recommends 1,3- butadiene be regarded as potential occupational carcinogen and as a possible reproductive hazard. They have not recommended any permissible exposure limits.

▪ ACCUTE EFFECTS
OVEREXPOSURE

Exposure to rapidly expanding gas or vaporizing liquids may cause irritation of the eyes, nose and throat, drowsiness, and lightheadedness. It has anesthetic action and exposure to very high concentrations may cause unconsciousness and death. If spilled on the skin, it might cause frostbite and irritation.

▪ CHRONIC EFFECTS
OF OVEREXPOSURE

Possible carcinogen, leukemia, lymph sarcoma, and reproductive hazard.

Date prepared: September 7, 2007

FIRST AID INFORMATION

- INHALATION Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.
- CONTACT Prompt medical attention.

REACTIVITY DATE

- STABILITY () Stable. (X) Unstable.
- POLYMERIZATION Must be stabilized to prevent polymerization; avoid exposure to air to prevent unstable polymer or explosive peroxide formation.
- INCOMERIZATION Air, oxidizing agents, acetylide forming metals, ether, caustics, amines, alkanolamines, halogenated compounds, alcohols, glycols, glycol, moisture, ether, phenols, alkylene oxides, ammonia, halogens, acid anhydrides.
- HAZARDOUS DECOMPOSITION/
OXIDATION PRODUCTS Explosive Peroxides. Material is unstable

SPILL OR LEAKAGE PROCEDURE

Shut off all ignition sources and ventilate the area. For controlling large flow, personnel may have to wear approach-type protective suits and positive pressure self-contained breathing apparatus. If in public area, keep public away and advise authorities. Warn occupants and shipping in surrounding and downwind areas of fire and explosion hazard and request all to stay clear. For a water spill, allow to evaporate from surface. Consult an expert on disposal of recovered material and ensure conformity to local disposal regulations.

PRECAUTIONS

- STORAGE RECOMMENDATIONS Cylinders should be stored and used in dry, cool, well-ventilated areas away from sources of heat or ignition. Do not store with oxidizers. Protect material from direct sunlight. Use proper bonding and /or grounding procedures. Do not pressurize, cut, heat, or weld containers.
- STORAGE TEMPERATURE Ambient.
- LOADING/UNLOADING TEMPERATURE Ambient
- LOADING/UNLOADING VISCOSITY 0.4 cst
- STORAGE/TRANSPORT PRESSURE 1 atmosphere or above
- PERSONAL PROTECTIVE EQUIPMENT
 1. Eye protection – For open systems, gas proof goggles should be worn. For vaporizing liquid and expanding vapor wear safety glasses with side shields.
 2. Respiratory protection – Approved respiratory equipment must be worn when airborne concentrations exceed safe levels.
 3. Skin protection – long sleeves and insulating gloves.

Date prepared: September 7, 2007

GAS INNOVATIONS

MSDS – BUTADIENE
PAGE 4 OF 4

-
- BEFORE USING THE GAS
 1. Secure the cylinder to prevent it from failing or being Knocked over.
 2. Install check valves or traps to prevent suckback to the cylinder.
 3. Ground all lines and equipment.
 4. Leak check the lines and equipment.
 5. Have an emergency plan covering steps to be taken in the event of an accidental release.

REGULATORY INFORMATION

- SARA TITLE III

Under the provisions of Sections 311/312, this product is classified into the following hazard categories:

1. Delayed Health.
2. Fire.
3. Sudden Release of Pressure.
4. Reactive.

This information may be subject to the provisions of the Community Right-to-know Reporting Requirements (40 CFR 370) if threshold quantity criteria are met. This product contains the following Section 313 Reportable Ingredients.

Component	1,3 – Butadiene
CAS Number	106-9-0
Maximum %	99.5

DISCLAIMER

The information, recommendations, and suggestions herein were compiled from reference material and other sources believed to be reliable. However, the MSDS's accuracy or completeness is not guaranteed by Gas Innovations or its affiliates, nor is any responsibility assumed or implied for any loss or damage resulting from inaccuracies or omissions. Since conditions of use are beyond our control, no warranties of merchantability or fitness for a particular purpose are expressed or implied. This MSDS is not intended as a license to operate under, or recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

Date prepared: September 7, 2007