SAFETY DATA SHEET (SDS)

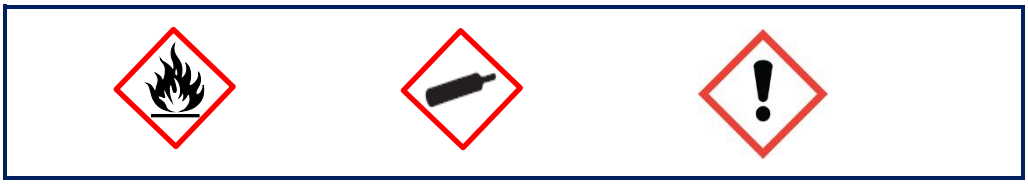
SDS in accordance with UN GHS Purple Book **CAP – SDS – 12 – Butene-1 (Rev.03)**

This SDS is effective as from 29 Feb 2024 and supersedes previous document published | Validity date: 28 Feb 2029

SECTION-1. IDENTIFICATION

Product/Material	:	**Butene-1, 1-Butene**
Recommended Use	:	Manufacturing of substances i.e. comonomer for polyethylene polymerization, etc.
Manufacturer	:	**PT Chandra Asri Pacific, Tbk.**
Head Office	:	Wisma Barito Pacific, Tower A, 5th floor, Jl. Letjend S. Parman, Kav.62-63. Jakarta 11410, Indonesia. Phone: +62-21-5308505, Fax: +62-21-5308506.
Plant	:	Jl Raya Anyer Km.123, Ciwandan, Cilegon 42447, Indonesia. Ph: 62-254-601501.
Emergency contact (24 hrs)	:	Ph: 62-254-601501 Ext 1232

SECTION-2. HAZARD IDENTIFICATION

GHS Classification	:	Flammable gases: Category 1A | Gases under pressure: Compressed gas
Hazard statements	:	H220: Extremely flammable gas | H280: Contains gas under pressure; may explode if heated
Pictogram (Hazard Symbols)	:	
Signal Word	:	DANGER
NFPA Hazard Rating	:	Health = 1 Flammability = 4 Reactivity = 0
Precautionary Statements	:	P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking | P377: Leaking gas fire: Do not extinguish, unless the leak can be stopped safely | P381: In case of leakage, eliminate all ignition sources | P391: Collect spillage | P410+P403: Protect from sunlight. Store in a well-ventilated place | P501: Dispose of contents/container in accordance with local/regional/national/international regulations.

SECTION-3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity	:	But-1-ene	CAS No : 106-98-9
Common Name	:	Butene-1	
Concentration	:	> 99 wt %.	Impurities : < 1.0 wt %.

Component		CAS No	Concentration
Butene-1	:	106-98-9	> 99 wt %
Impurities	:	-	1 wt % max

SECTION-4. FIRST-AID MEASURES

General	:	May cause respiratory issue when inhaled. Put victim to fresh air with breathing apparatus. Frostbite may occur when in contact with skin and irritation may occur when

		contacting with eyes. Flush contaminated skin or eyes with water for at least 15 minutes.
Inhalation	:	May cause oxygen deprivation in high concentration. Victim may fall unconscious or losing mobility. Remove victim to fresh air and keep at rest in a comfortable position for breathing. Loosen tight clothing such as belt, waistband, collar, or tie. If victim is not breathing or if breathing is irregular, provide a self-contained breathing apparatus. Do not give mouth-to mouth resuscitation. Get medical attention immediately.
Skin contact	:	Frostbite or freezing of skin may occur if contact with evaporating liquid. Flush contaminated skin with water for at least 15 minutes. Remove contaminated clothing, then soak with water to prevent static discharge and gas ignition. Wash thoroughly before reuse. Get medical attention if other symptom occurs.
Eyes	:	Wash immediately with water when contamination occur. Remove contact lenses if possible. Continue rinsing for at least 15 minutes. Get medical attention immediately. Flush eyes for another 15 minutes id medical assistance is not available.
Ingestion	:	Not applicable. Refer to inhalation section.
Frostbite	:	Do not rub the frosted part and thaw with lukewarm water (no more than 41^{o}C or 105^{o}F). Get medical attention immediately.
Note to Physician	:	There is no specific antidote. Treatment of overexposure should be directed at symptoms control and the clinical condition.

SECTION-5. FIRE-FIGHTING MEASURES

Flammable Properties	:	Explosion may occur when exposed to heat.
Unsuitable Extinguishing Media	:	Do not use carbon dioxide
Suitable Extinguishing Media	:	Water Spray or Fog; Foam; or Dry powder.
Special Protective Equipment	:	Use standard personal protective equipment before extinguishing fire, including flame retardant coat, helmet with face shield, rubber boots, gloves, and SCBA (for extinguishing in confined space). For more information please refer to EN 469 (protective clothing), EN 15090 (footwear), EN 659 (gloves), EN 443 (helmets), and EN 137 (respiratory protection).
Precautions for Fire-Fighting	:	In case of fire, isolate the scene by removing all persons near the vicinity of the incident. If it is safe and possible, stop leak and move containers from fire area. Do not extinguish flames at leaking container due to the possibility of explosive re-ignition. Spray the container with water from safe position until the container cooled off. Isolate the source of fire and eliminate all ignition source if it is safe to do so. If not possible, let the fire burn out and keep extinguishing from safe position.
Hazardous Combustion Products	:	Incomplete combustion may form carbon monoxide.

SECTION-6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	:	Accidental releases may cause fire or explosion. Evacuate surrounding area immediately. Eliminate all ignition source to prevent fire or explosions. Avoid breathing in the gas. Provide adequate ventilation and wear breathing apparatus when entering contaminated area. Observe the concentration of released product, and prevent material from entering waterways, sewer, basement, or any place where it could accumulate and generate fire or explosions.
Environmental Precautions	:	Prevent waste from contaminating environment (waterways, sewer, soil, etc), and prevent further leakage or spillage if safe to do so. Inform the relevant authorities if the product has caused environmental pollution.
Methods for Cleaning up	:	Contact emergency personnel immediately. Prevent further leakage if it safe to do so. Use spark-proof and explosion-proof equipment.

SECTION-7. HANDLING AND STORAGE

Precautions for safe handling : Gases under pressure should only be handled by experienced personnel. Use appropriate personal protective equipment. Avoid breathing gas in, and handle in adequate ventilation. System should be purged with inert gas before gas is introduced, and when system is not used. Use spark-proof and explosion-proof equipment. Keep away from all ignition sources. Please refer to supplier's handling instruction, also good industrial hygiene and safety procedure when handling product. Make sure no leak is present in the system. Do not roll, drag, slide, drop, or puncture the container to avoid physical damage. Keep the container label intact for identification of content. Keep containers in upright position and use suitable equipment when moving containers (e.g. fork truck, hand truck, trolley, etc.). Store containers in a well ventilated place below 50^{o}C and in accordance with regional / international regulation. Do not use electrical heating device or direct flame for increasing container pressure. Eating, drinking, or smoking is not allowed when handling product. Keep the protection caps in place until the container is placed securely and ready to use. Do not attempt to modify or repair the container or its safety relief device. Do not transfer gas from one container to another.

Conditions for safe storage, including incompatibilities : Store product in accordance with regional / international regulation. Keep away from direct sunlight, open flame, or electrical heating device in a well ventilated area. Keep away from combustible material, oxidant gases or other oxidant to avoid fire and explosions. Containers should be checked periodically for any leakage. Valve protective caps should always be in place.

SECTION-8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Information on the system design: Apply a work permit system for installation, maintenance activities, etc. Maintain concentration below lower explosion limits. Make sure there is sufficient air ventilation, including and equipped with local and general exhaust so that the defined occupational exposure limit is not exceeded. Use gas detectors when flammable gas or vapor may be released. Systems should be periodically checked to ensure there is no leakage. Only use permanent leak tight installations (e.g. welded pipes) to ensure no leakage occurs. Pay attention to possibilities of static discharge.

Ingredients	Reference	TWA (ppm)
But-1-ene	ACGIH TLV	250

Personal protective equipment

Respiratory Protection : Use a proper respiratory protection to protect against evaporating liquid. Use air purifying cartridge appropriate for chemical exposure if needed. For emergencies or at unknown exposure level, use self-contained breathing apparatus (SCBA).

Hand Protection : Wear neoprene gloves while handling containers. Refer to EN 388 for guideline.

Skin and Body Protection : Wear flame/fire retardant/resistant clothing. Refer to ISO/TR 2801:2007 for guideline.

Eyes Protection : To protect eyes from liquid splashes, wear safety goggles or face-shield. Refer to EN 166 for guideline.

SECTION-9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Gas at ambient conditions, liquid under pressure.	Partition Coefficient Octanol /Water (Log Pow)	2.40
Color	Colorless	Explosive Properties	Not applicable
Odor	Slightly aromatic	Molecular Weight	56.11 g/mol
pH	Not Applicable	Lower Flammable (explosion) Limit	1.2%

Odor Threshold	Odor threshold is subjective and is inadequate to warn of over exposure.
Boiling Point/Boiling Range	-6,2°C (20.8°F)
Melting Point	-185°C (-301°F) Experimental result, Key study
Flash Point	-80°C
Auto Ignition Temperature	385°C (725°F)
Flammable Classification	Extremely Flammable
Vapor Pressure	2.5 atm at 20°C (68°F)

Upper Flammable (explosion) Limit	10.6%
Specific gravity (water=1)	0.577 at 25°C (liquid)
Water Solubility	221 mg/l at 25°C
Evaporation rate	Not Applicable
Relative vapor density	1.93 (air = 1)
Oxidizing Properties	Not Applicable

SECTION-10. STABILITY AND REACTIVITY

Reactivity Chemical Stability : Products are stable under normal condition. No danger of reactivity than the ones described below.

Possibility of Hazardous Reaction & Polymerization : Products may react with antioxidants violently, forming potentially explosive atmosphere in air.

Condition to Avoid : Product should be kept away from sparks, open flames, heat, hot surfaces, and other ignition sources. No smoking near product or container.

Materials to Avoid : Avoid contact with air, oxidizer, acid, and halogens. Refer to ISO-11114 for further material compatibility.

Hazardous Decomposition Products : Hazardous decomposition product should not be produced under normal conditions of storage and use. Thermal decomposition may produce carbon monoxide and carbon dioxide.

SECTION-11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Moderate concentration may cause drowsiness, dizziness, headache, excitation, excess salivation, vomiting, and / or unconsciousness

Repeated Dose Toxicity

NOAEL (Rat (Female, Male), Inhalation): 18.359 mg/m^3 Inhalation Experimental result, Key study.

Carcinogenicity

Based on available data, product is not classified as carcinogenic.

Special Remarks on Other Toxic Effect on Humans

Base on available data, product is not classified toxic for skin, eye, respiratory, skin, germ cell mutagenicity, and reproductive and specific target organ.

SECTION-12. ECOLOGICAL INFORMATION

Eco Toxicity (Acute) : Fish : LC50 (96 h): 19 mg/L | Daphnia magna (water flea) : EC50 (48h) = 11 mg/L | Algae : EC50 (72 h): 6.5 mg/L

Mobility : Product is unlikely to cause ground or water pollution due to its high volatility. Henry's Law Constant: 1.307 MPa (25 °C)

Persistence and Degradability : Not applicable to gases and gas mixtures

Soil : Mixture will distribute 99.9% into air and virtually no distribution into soil

Water : Mixture will distribute 99.9% into air with some small part into water.

Bioaccumulation Potential : Product should biodegrade and should not remain for long periods in aquatic environment

Biodegradation Potential : Product should biodegrade and should not remain for long periods in aquatic environment

Environmental Adverse Effects : Product should cause no ecological damage.

SECTION-13. DISPOSAL CONSIDERATIONS

Waste Disposal

Do not dispose product into any place where accumulation may cause hazard, or where there is a risk of forming an explosive mixture. Contact supplier for specific instruction or recommendation. Only dispose the container via supplier. Waste gas should be flared using suitable burner with flash back arrestor. Please refer to EIGA code of practice Doc. 30 for guideline. Discharge or disposal may be subject to regional or national regulations.

Contaminated packaging:

Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION-14. TRANSPORT INFORMATION

UN Number/Label	UN 1012	
UN Proper Shipping name	1-BUTYLENE	
Transport Hazard Class	ADR (Road Transport)	2 (2.1 flammable gas)
	RID (Rail Transport)	2 (2.1 flammable gas)
	IMDG class (Marine Transport)	2.1 (2.1 flammable gas)
	IATA class (Air Transport)	2.1 (2.1 flammable gas)
Packing Group	None	

SECTION-15. REGULATORY INFORMATION

Regulatory Information : KEPMEN 187/Men/1999 Pengendalian Bahan Kimia Berbahaya
PERMENLH RI No. 3 Year 2008: Tata Cara Pemberian Simbol dan Label Bahan Berbahaya dan Beracun.
PERMENPERIN RI No.23/M-IND/PER/4/2013: Sistem Harmonisasi Global Klasifikasi dan Label pada Bahan kimia

SECTION-16. OTHER INFORMATION

Training Advice : Provide adequate training for users of breathing apparatus. Ensure operators know the flammability hazard.

Recommended Uses : THE PRODUCT IS RESTRICTED TO PROFESSIONAL USAGE. Ensure all national/local regulations are observed. Ensure operators understand the flammability hazard. This Safety Data Sheet has been established in accordance with the applicable European. Directives and applies to all countries that have translated the Directives in their national laws. Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Abbreviations that may have been used in this document:

ACGIH : American Conference of Governmental Industrial Hygienist
ADR : European Agreement concerning the Int'l Carriage of Dangerous Goods by Road
CAS : Chemical Abstract Service
EC50 : Effective Concentration, concentration of a chemical which results in a 50% reduction of algae growth, algae growth rate, or Daphina immobilization.
EIGA : European Industrial Gas Association
EN : European Standard

IATA	:	International Air Transport Association
IMDG	:	International Maritime Dangerous Goods
ISO	:	International Organization for Standardization
LC50	:	Lethal Concentration, concentration of chemical which kills 50% of a sample population
NFPA	:	National Fire Protection Association
NOAEL	:	No Observed Adverse Effect Level
RID	:	International Rule for Transportation of Dangerous Substance by Railway
TLV	:	Threshold Limit Value
TWA	:	Time Weighted Averages
UN	:	United Nation

This Safety Data Sheet (SDS) contains the following historical revisions:

Rev No	Issued Date	Revision Change	Description
00	16 Mar 2020	Original Document	
01	15 Sep 2021	SECTION-01	Contact person was modified
02	30 Jun 2023	SECTION-01	Update emergency contact information
		SECTION-02	Hazard and precautionary statements were modified
03	29 Feb 2024	SECTION-01	Change on company's name

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