SAFETY DATA SHEET (SDS)

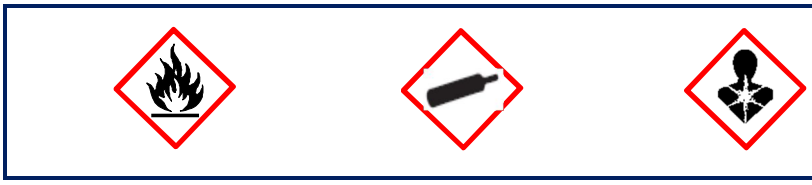
SDS in accordance with UN GHS Purple Book **CAP – SDS – 11 – Raffinate-1 (Rev.01)**

This SDS is effective as from 25 Jan 2019 and supersedes previous document published | Validity date: 25 Jan 2024

SECTION-1. IDENTIFICATION

Product/Material	:	**Raffinate-1**
Recommended Use	:	Manufacturing of substances, distribution of subtance, use of intermediate, formulation and (re) packing of substance and mixture
Manufacturer	:	**PT. Petrokimia Butadiene Indonesia (PBI)**
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)	:	GROUPSHEDIVISION@capcx.com, Ph: 62-254-601829, 601501 Ext 1232
Additional Information	:	GROUPRND@capcx.com, Phone: +62-254-601501 Ext 1309, 1616

SECTION-2. HAZARD IDENTIFICATION

GHS Classification	:	Gases under pressure, Liquefied gas
Hazard statements	:	Extremely Flammable gas | Contains gas under pressure; may explode if heated | May cause cancer | May cause genetic defects.
Pictogram (Hazard Symbols)	:	
Signal Word	:	DANGER Extremely Flammable Gasses Category 1
NFPA Hazard Rating	:	Health = 2 Flammability = 4 Reactivity = 2
Precautionary Statements	:	Obtain special instructions before use|Do not handle until all safety precautions have been read and understood|Keep away from heat/sparks/open flames/hot surfaces–No Smoking|Keep container tightly closed|Ground/bond container and receiving equipment|Use explosion-proof electrical/ventilating/ lighting/equipment|Use only non-sparking tools|Liquid causes frostbite on skin contact|Take precautionary measure against static discharge|Avoid breathing dust/fume/gas/ mist/vapors/spray|Wash skin thoroughly after handling|Do not eat, drink or smoke when using this product|Use only outdoors or in a well–ventilated area |Avoid release to the environment|Wear protective gloves/protective clothing/eye protection/face protection.

SECTION-3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity : Raffinate-1 CAS No : 92045-23-3

Common Name : C4 Raffinate-1

Component		CAS No	Concentration
1,3 Butadiene	:	106-99-0	Max 0.2 % wt
Hydrocarbon (C1+C2+C3's)	:	-	Max 0.3 % wt

Iso and N-Butane	:	75-28-5 / 106-97-8	Max 20 % wt
1-butene + cis & trans-2 butene & i-butene	:	-	Min 79 % wt
1-Butene/2-butene ratio	:	106-98-9 / 107-01-7	Min 1.5
1-Butene	:	106-98-9	Min 35 % wt
Total C5	:	-	Max 0.3 % wt
Total sulfur	:	-	Max 5 ppm wt
Fe + K + Na	:	-	Max 2 ppm wt
Acetylene (as VA + EA)	:	74-86-2	Max 5 ppm wt
Basic Nitrogen (as N)	:	7727-37-9	Max 1 ppm wt
Heterogeneous (free) water		-	Nil

SECTION-4. FIRST-AID MEASURES

General : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.

Inhalation : If adverse effect occurs, remove to uncontaminated area. Give artificial respiration at hot breathing. Obtain prompt medical attention.

Skin contact : Flush exposed skin with plenty of water. Remove contaminated clothing, including shoes, and thoroughly clean and dry before reuse. Seek medical attention at once.

Eyes contact : Immediately flush eyes with plenty of water for at least 15 minutes. Seek medical attention at once.

Ingestion : No required

Frostbite : Try to warm up the frozen tissues and seek medical attention at once.

Note to Physician : Treat unconsciousness, frostbite, nausea, hypotension, seizures and cardiac arrhythmia in the conventional manner. Sympathomimetics or catecholamines should be avoided or used with caution (lowest effective dose) because of possible cardiac sensitization. Administer oxygen by mask if there is respiratory distress.
Treatment for overexposure should be directed at controlling the symptoms and clinical condition of the patient. After adequate first aid, no further treatment is necessary, unless symptoms reappear.

SECTION-5. FIRE-FIGHTING MEASURES

Flammable Properties : Fire and container explosion hazard are extremely high when this product is exposed to heat or flame. Use massive Quantity of water to cool fire-exposed containers. Immediately withdraw in case of fire and container venting or heat is coloration of containers. Vapors are heavier than air and may travel to some distant source of ignition and flash back. Consider immediately emergency isolation and evacuation. Do not attempt to extinguish a gas fire unless leak source can be isolated and shut off. Be aware of possibility re-ignition. If a pipe line, storage vessel, rail car or tank truck is possibly ruptured or involved in a fire, isolate for 1600 meters (1 mile) in all directions, also consider for evacuation for 1600 meters (1 mile) from all directions.

Unsuitable Extinguishing Media : Do not use water jet

Suitable Extinguishing Media : Alcohol-resistant foam. Carbon dioxide (CO_2). Dry chemical. Water fog

Special Protective Equipment : Wear self-contained breathing apparatus when entering area unless atmosphere is prove safe.

Precautions for Fire-Fighting : Keep unnecessary personnel away. Pipeline and container explosion hazards are extremely high when this product had exposed to heat or flame. May explode when

		heated or involved in a fire. Use massive quantities of water to cool fire-exposed pipelines or containers. Immediately withdraw in case of fire and tank venting or heat discoloration of a tank. Vapors may travel to some distant source of ignition and flash back. Be aware of possibility re-ignition. When pressure in a container needs to be controlled, consider setting up emergency isolation and evacuation for at least 800 meters. If tank is involved in a fire, ISOLATE for 1600 meters in all directions.
Hazardous Combustion Products	:	Upon combustion, this product emits acid smoke and fumes.
Specific Hazards during fire fighting	:	Do not allow run-off from fire-fighting to enter drains or water courses. This product density is heavy more than air please caution with flash back of fire.

SECTION-6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
Environmental Precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for Cleaning up	:	Immediately contact emergency personnel, stop leak if without risk using non sparks tool and explosions proof equipment, contain spillage, and then collect with non-combustible absorbent material, (e.g sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local/national regulations (see section 13).

SECTION-7. HANDLING AND STORAGE

Precautions for safe handling	:	Keep locked up or secured. Handle in fully enclosed, grounded, properly designed and approved liquefied pressurized gas systems. Keep away from heat and ignition sources. Procedures and design should exclude oxygen from the handling and processing systems. Use with adequate ventilation. Avoid contact with eye and skins. Avoid breathing gas or vapors. Keep away from uncontrolled heat, ignition source and incompatible materials. Wear suitable protective equipment including thermally protective gloves. No smoking or open flames permitted in storage, use or handling areas. Take special precautions when breaking into lines. Equipment and piping may require treatment (decontamination) prior to exposure to air for maintenance or disposal/salvage.
Conditions for safe storage, including incompatibilities	:	Storage area should be clearly identified, well illuminated, clear obstruction and accessible to Only trained and authorized personnel. Ground all material handling and transfer equipment to dissipate build up static electricity. Storage, shipping and processing required review of risk and use suitable inhibitor such as t-butyl catechol (TBC) is added at concentration of 30 – 150 ppm wt to prevent formation of peroxide and polymer, or equivalent.

SECTION-8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Information on the system design:

Engineering methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems and other process modifications. Ensure all exhaust ventilation systems are discharge to outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal prospective equipment may also required. Personal protective equipment should not be considered a long-term

solution to exposure control. Person in ill health where such illness would be aggravated by exposure to product should not be allowed to work with or handle this product.

Ingredients	Reference	TWA		STEL	
		ppm	mg/m^3	Ppm	mg/m^3
1,3 Butadiene	ACGIH	2	4.4	DNA	
	OSHA PEL (11/2006)	1		5	
Isobutane	ACGIH	1000	-	-	-
2-Butene	ACGIH	250	-	-	-
Butene	ACGIH	1000	-	-	-
Butane	ACGIH	250	-	-	-
Cis-2-butane	ACGIH	250	-	-	-

Personal protective equipment

Ventilation : Control airborne concentrations below the exposure guidelines.

Respiratory Protection : If engineering controls and ventilation is not sufficient to prevent build-up of aerosols or vapor and/or oxygen concentrations are low, appropriate air supplied breathing apparatus should be use.

Hand Protection Use impervious gloves designed to prevent freezing of body tissues if contact with liquefied gas is possible made from silver shield or viton or butyl or chemsoft. Wear chemical-resistant safety footwear with good traction to prevent slipping.

Skin and Body Protection : Work clothing that sufficiently prevents skin contact and prevents freezing of body tissues if contact with liquefied gas is possible should been worn, such as coveralls and/or long sleeves and pants. Fire resistant (i.e., Nomex) or natural fibber clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and would not recommend where flammable vapor releases may occur.

Eyes Protection : Wear safety glasses. Use of chemical goggles under a full-face shield is recommended if contact with liquefied vapor is possible.

SECTION-9. PHYSICAL AND CHEMICAL PROPERTIES

Color	Colorless
Physical state and Appearance	Gas at ambient conditions, liquid under pressure.
Odor	Peugent
Odor Threshold	Detectable at 0.45 ppm/ 1.0 mg/m^3 (1,3-butadiene)
pH	Not applicable
Boiling Point/Boiling Range	-65^{O}C (literature)
Melting Point Flash Point	Not applicable -80^{O}C
Auto-ignition	313^{O}C (595.4^{O}F)
Flammable Classification	Extremely Flammable
Lower Flammable (explosion) Limit	1.6% (literature 1-butene)
Upper Flammable (explosion) Limit	10% (literature 1-butene)

Explosive Properties	No data available
Oxidizing Properties	On exposure to air form peroxides, initiating explosive polymerization
Vapor Pressure	2.42 atm at 20^{O}C (68^{O}F)
Evaporation Rate	Not applicable

Solubility (Water)	Insoluble (literature)
Partition Coefficient Octanol/Water (Log Pow)	No data available for this product
Specific gravity (at 20^{O}C)	0.6 (literature)
Relative Vapor Density	1.9 (air=1)
Evaporation	Immediate at 27^{O}C
Additional Physical and Chemical Properties	No additional information available.

SECTION-10. STABILITY AND REACTIVITY

Reactivity Chemical Stability : No dangerous known under conditions of normal use. Stable under recomended storage conditions. Unstable at unelevated temperature.

Possibility of Hazardous Reaction & Polymerization : Polymerization can occur because of elevated temperature. High temperature can be catalyzed to form polymerization

Condition to Avoid : Avoid static dicharcage. Elevated temperature can cause to decompose product. Generating of gas during decomposition can cause pressure in closed system.

		Pressure build-up can be rapid.
Materials to Avoid	:	Product can react with water to form hydrates. Avoid strong acids, strong oxidizing agents, chlorine, halogens, organic peroxides, ozone and nitrogen dioxide. Many materials become brittle after contact with liquefied gases and hoses periodically to ensure integrity and compatibility.
Hazardous Decomposition Products	:	Decomposition product depend upon temperature, air supply and the present of other materials can include but not limited to : carbon monoxida, carbon dioxide. Gases are released during decomposition.
Special Remarks	:	Vapors may form an explosive mixture with air. May react vigorously with oxidizing agents.

SECTION-11. TOXICOLOGICAL INFORMATION

Acute Toxicity

This product is considered acutely toxic. At very high exposure, it produces an anesthetic effect. Excessive exposure may cause headache, dizziness, nausea, loss of coordination, and in extreme conditions coma and possible death. The liquefied form will cause freezing burns (frostbite) to the eyes and skin. Contact can irritate the skin and may cause frostbite. Inhalation irritates the respiratory tract causing coughing and wheezing. DANGER! Inhalation cause drowsiness, light headacheness, unconsciousness, and at very high exposure death.

4h inhalation-rat	**LC50**	285.000 mg/m^3
2h Inhalation Mouse	**LC50**	270.000 mg/m^3

Repeated Dose Toxicity

Chronic Toxicity In rats, minimal toxicity effects were reported with no observable adverse effect levels (NOAEL) at the highest concentration tested (17,679 mg/m^3/800 ppm for 90 day exposure). Prolonged and repeated exposure may cause irritation effects and hematological changes. Elevated incidence of lymphomas, leukemia, and other neoplastic disease of the blood system are found in studies of butadiene monomer production workers.

Carcinogenicity

EPA : Group 3 – Not classified as human carcinogen
ACGIH : A2 (Suspected Human Carcinogen)
IARC : Group1 (Carcinogenic to humans)
OHSA-Proven for humans
NTP-Classified 1 – Known human carcinogen

Special Remarks on Other Toxic Effect on Humans

The substance may effect on the bone marrow, resulting in leukemia. This substance is probably carcinogenic to human. May cause heritable genetic damage in humans. Animal test show that this substance possibly causes toxic effect upon human reproduction. Repeated exposures may cause injury to lungs, liver and kidney.

SECTION-12. ECOLOGICAL INFORMATION

Eco Toxicity	:	Fish : LC50= 43 mg/196 hrs
Acute Toxicity	:	Daphnia magna (Water flea) : LC50=24mg/196hrs | Green algae: EC50=11 mg/l
Mobility	:	Modeling indicates that the product will distribute 99.96% into air, 0.03% into water, and < 0.01% into soil, sediment, suspended sediment and biota. For raffinate-1, the log Kow is 1.99, the estimated soil absorption coefficient is 288 and the log Koc is estimated between 1.86 to 2.36, indicating some mobility in soil. Components are not expected to hydrolyze in water.
Persistence and Degradability	:	Components are not expected to be persistent in the air. Product will react with photochemical produced radicals, which an estimated half-life in the order of a few hours for 1,3 butadiene to 48 hours for butane.
Air	:	Components are not expected to be persistent in the air. Airborne degradation by

		product of butadiene may induce adverse health effects. Product will photo chemically react.
Soil	:	Mixture will distribute 99.9% into air and virtually no distribution into soil, sediment
Water	:	Mixture will distribute 99.9% into air with some ppm into water.
Bioaccumulation Potential	:	The log Kow = 1.99, this product is not expected to bio concentrate
Biodegradation Potential	:	Biodegradation is likely to occur. Biodegradation has found to rapidly occur to constituent chemicals at variable rates based on environmental conditions and not persist.
Environmental Adverse Effects	:	The product has not classified as dangerous for environment. The product evaporates readily exposure to aquatic life is expected to be minimal.

SECTION-13. DISPOSAL CONSIDERATIONS

Waste Disposal

This product as sold is ignitable and, if disposed of, would be considered a hazardous waste according to regulations. The use, mixing or processing of this product may alter its properties or hazards. When in contact with liquefied gases, most material become brittle and are likely to break without warning. Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.

Product:

The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

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	1965	
UN Proper Shipping name	Hydrocarbon mixture, liquified, N.O.S (Mixture)	
Transport Hazard Class	Road (ADR)/Rail (RID)/Water (ADNR)	2 (2.1 flammable gas)
	IMDG class (Marine Transport)	2 (2.1 flammable gas)
	ICAO/IATA class (Air Transport)	2 (2.1 flammable gas)
	TDG (Transportation Dangerous Goods)	2
Packing Group	None	
Marine Pollutant	Yes	

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	:	Personal handling the product need to be demonstrably with its hazardous properties, with health and environmental protection principles related to the product and first aid principles.
Recommended Uses	:	THE PRODUCT IS RESTRICTED TO PROFESSIONAL USAGE. Ensure all national/local regulations are observed. Ensure operators understand the

flammability hazard. The hazard of asphyxiation is often overlooked and must be stressed during operator training. 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.

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

Rev No	Issued Date	Revision Change	Description
00	09 Jan 2015	Original Document	
01	25 Jan 2019	SECTION-02	NFPA was modified

Abbreviations that may have been used in this document:

ACGIH : American Conference of Governmental Industrial Hygienist
ADNR : European Agreement concerning the International Carriage of Dangerous Goods by inland Waterways
ADR : European Agreement concerning the International Carriage of Dangerous Goods by Road
CAS : Chemical Abstract Service
EPA : Environmental Protection Agency
EU : European Union
IATA : International Air Transport Association
ICAO : International Civil Aviation Organization
IMDG : International Maritime Dangerous Goods
IMO : International Maritime Organization
LC50 : Lethal Concentration, concentration of chemical which kills 50% of a sample population
LD50 : Lethal Dose, dose of a chemical which kills 50% of a sample population
NFPA : National Fire Protection Association
NTP : National Toxicology Program
OSHA : Occupational Safety and Health Administration
RID : International Rule for Transportation of Dangerous Substance by Railway
TDG : Transportation Dangerous Goods
TLV : Threshold Limit Value
TWA : Time Weighted Averages

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