

## SAFETY DATA SHEET

Safety Data Sheet in accordance with UN GHS Purple Book

CAP – SDS – 11 – Raffinate-1 (Rev.00)

ISSUED DATE : 09 Jan 2015

### SECTION-1. IDENTIFICATION

Product/Material : **Raffinate-1**

Recommended Use : Manufacturing of substances, distribution of substance, use of intermediate, formulation and (re) packaging of substance and mixture

Manufacturer : **PT. Petrokimia Butadiene Indonesia (PBI)**

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### 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

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	:	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 <sub>2</sub> ). 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 <sup>3</sup>	Ppm	mg/m <sup>3</sup>
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	Explosive Properties	No data available
Physical state and Appearance	Gas at ambient conditions, liquid under pressure.	Oxidizing Properties	On exposure to air form peroxides, initiating explosive polymerization
Odor	Peugent	Vapor Pressure	2.42 atm at 20°C (68°F)
Odor Threshold	Detectable at 0.45 ppm/ 1.0 mg/m <sup>3</sup> (1,3-butadiene)	Evaporation Rate	Not applicable
pH	Not applicable	Solubility (Water)	Insoluble (literature)
Boiling Point/Boiling Range	-65°C (literature)	Partition Coefficient Octanol/Water (Log Pow)	No data available for this product
Melting Point	Not applicable	Specific gravity (at 20°C)	0.6 ( literature )
Flash Point	-80°C	Relative Vapor Density	1.9 (air=1)
Auto-ignition	313°C (595.4°F)	Evaporation	Immediate at 27°C
Flammable Classification	Extremely Flammable	Additional Physical and Chemical Properties	No additional information available.
Lower Flammable (explosion) Limit	1.6% (literature 1-butene)		
Upper Flammable (explosion) Limit	10% (literature 1-butene)		

### 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<sup>3</sup>

**2h Inhalation Mouse LC50** 270.000 mg/m<sup>3</sup>

### 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<sup>3</sup>/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 leukaemia. 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 butadiene, 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

N 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
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### 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.

#### NFPA Hazard Rating for Raffinate-1

	Health-2	Intense or continued but not chronic exposure could cause temporary incapacitation or possible residual injury
	Flammability-4	Material will rapidly or completely vaporize at normal atmospheric pressure and temperature, or is readily dispersed in air and will burn readily
	Reactivity-2	Undergoes violent chemical change at elevated temperatures and pressures, reacts violently with water, or may form explosive mixtures with water

#### 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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