



SAFETY DATA SHEET

Safety Data Sheet in accordance with UN GHS Purple Book

CAP – SDS – 01 – Ethylene (Rev.00)

ISSUED DATE : 09 Jan 2015

SECTION-1. IDENTIFICATION

Product/Material	:	Ethylene
Recommended Use	:	Raw material for chemicals and petrochemical application, Production of polyethylene, ethylene copolymers, chemical synthesis etc.
Manufacturer	:	PT. CHANDRA ASRI PETROCHEMICAL Tbk (CAP)
Head Office	:	Wisma Barito Pacific, Tower A, 7th floor, Jl. Letjend S. Parman, Kav.62-63. Jakarta 11410, Indonesia.
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	:	GROUPEPRND@capcx.com, Ph: +62-254-601501 Ext 1869, 1616

SECTION-2. HAZARD IDENTIFICATION

GHS Classification	:	Flammable Gas: Category 1 Refrigerated liquefied gases Target organ toxicant (central nervous system, Narcotic effects): Category 3
Hazard statements	:	Extremely flammable liquid and vapor Contains gas under pressure; may explode if Heated Toxic to aquatic life with long lasting effects May be fatal if swallowed and enters airways Harmful if swallowed May cause cancer May cause genetic defects May damage fertility or the unborn child Causes serious eye irritation Causes skin irritation May cause drowsiness or dizziness May cause respiratory irritation.

Pictogram (Hazard Symbols)



Signal Word	:	DANGER
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 Keep cool Ground/bond container and receiving equipment Use explosion - proof electrical /ventilating/ lighting/ equipment Use only non-sparking tools Take precautionary measure against static discharge Wear protective gloves/protective clothing/eye protection/face protection Use personal protective equipment as required Do not eat, drink or smoke when using this product Wash thoroughly after handling Avoid release to the environment.

SECTION-3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity	:	Ethylene	CAS No: 74-85-1
Common Name	:	Ethylene (C ₂ H ₄)	
Concentration	:	≥ 99.95 % vol	Impurities : ≤ 0.05 % vol

SECTION-4. FIRST-AID MEASURES

- General : DANGER! Extremely cold, flammable liquid and gas under pressure. Can perform explosive mixtures with air. Can cause severe frostbite. May cause dizziness and drowsiness. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Self-contained breathing apparatus and protective clothing may required by rescue workers. Evaporates readily and forms cold fogs heavier than air and explosive mixture with air. Contact with liquefied gas may cause frostbite. In case of health troubles or doubts, seek medical advice immediately and show this Safety Data Sheet where possible. Ensure activity of vitally important functions until the arrival of doctor (artificial respiration, inhalation of oxygen, heart massage). If patient is unconscious, or in case of danger of black out (aspychia), transport patient in a stabilized position. In case of first-degree burns (painful redness), and second degree burns (painful blisters), cool the affected area with cold running water for a long time. In case of third degree burns (redness, cracking pale skin, usually without pain), do not cool affected skin, dress the area with sterile dry gauze only.
- Skin : More affected individual to non-contaminated air. Loosen tight clothing such as a collar, tie, belt or waistband to facilitate breathing. Seek immediate medical attention if the individual is not breathing, is unconscious or if any other symptoms persist. WARNING: Contact through mouth-to-mouth resuscitation may pose a secondary risk to the rescuer. Avoid mouth-to-mouth contact by using a mouth shield or guard to perform artificial respiration.
- Inhalation : For skin contact, wash immediately with soap and water. DO NOT USE HOT WATER. Seek medical attention if symptoms develop or persist. Thaw frostbite slowly with lukewarm water. DO NOT RUB affected area. Do not pull off adherent clothing or objects. Seek medical attention at once
- Eyes : If can be done safely remove contact lenses. Immediately flush eyes with cold water for at least 15 minutes, while holding eyelids open. DO NOT USE HOT WATER. Seek medical attention if symptoms develop or persist.
- Ingestion : Not applicable (gas)
- Note to Physician : Treat unconsciousness, frostbite, nausea, hypotension, seizures and cardiac arrhythmia in the conventional manner. Administer oxygen by mask if there is respiratory distress. Treatment of overexposure should be direct at controlling the symptoms and clinical condition of a patient. After adequate first aid, no further treatment is necessary unless symptoms reappear.

SECTION-5. FIRE-FIGHTING MEASURES

- Flammable Properties : Extremely flammable. Gas/air mixtures are explosive. In case of leakage high risk of fire. The gas is heavier than air and may travel along the ground ignition is possible. Vapors may form an explosive mixture with air. Keep containers away from source of heat or fire. Highly explosive in the presence of sparks, fire, heat and oxidizing agents.

Extinguishing Media

- Suitable Extinguishing Media : Dry chemical, foam, carbon dioxide, and water fog. Do not use water jets. Foam cover may help suppress evolution of flammable gas. Use massive quantities of water to cool fire-exposed containers and to protect personnel. Do not attempt to extinguish a leaking gas fire unless leak source can be isolated and shut off. Let uncontrolled fire burn off.
- Unsuitable Extinguishing Media : Do not use water jet.

Specific Hazards in Case of Fire

Hazardous Combustion Products : Upon combustion, this products emits carbon monoxide, carbon dioxide, and/or low molecular weight hydrocarbons.

Special Protective Equipment and Precaution for Fire Fighter

Special Protective Equipment : Full-face self-contained breathing apparatus, thermal protective clothing.
Precautions for Fire- Fighter : 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 800m. If tank is involved in a fire, ISOLATE for 1,600m in all directions. Let uncontrolled fires burn off. Fire fighter should wear full-face, self-contained breathing apparatus and thermal protective clothing. Avoid inhaling any smoke and combustion materials Remove and clean or destroy any contaminated clothing. Cools containers with flooding quantities of water until well after the fire is out. Control runoff waters to prevent entry into ditches, sewers, drains, underground or confined spaces and waterways.

SECTION-6. ACCIDENTAL RELEASE MEASURES

Personal Precautions : Wear self-contained breathing apparatus when entering area unless atmosphere is prove safe.
Environmental Precautions : Avoid entry of product into drains, sewers, or waterways
Methods and Materials for Containment and Cleaning up : Evacuate area. Ensure adequate air ventilation. Do not touch spilled material. No smoking or open flames permitted in storage, use or handling areas. Eliminate ignition sources. Dissipate static electricity during transfer or processing by proper earthing (grounding) and bonding of containers and equipment.

SECTION-7. HANDLING AND STORAGE

Precautions for Safe Handling : Wear self-contained breathing apparatus when entering area unless atmosphere is prove safe. Keep locked up or secured. This material can be stored ad a flammable gas or liquid depending on the temperature and pressure. Handle in fully enclosed, grounded, properly designed and approved transfer and storage systems. Use with adequate ventilation. Avoid inhalation. Keep away from uncontrolled heat and incompatible materials. Ground all material handling and transfer equipment to dissipate build-up of static electricity. Wear suitable protective equipment including thermally protective gloves. No smoking or open flames permitted in storage, use or handling areas. If used in refrigeration, check drains are they not plugged and valves are working and not plugged by ice formed from the vaporizing liquid.
Conditions for Safe Storage, including Incompatibilities : Storage area should be clearly identify, well illuminated, clear of obstruction and accessible only to trained and authorized personnel. Store in grounded, properly designed and approved pressure containers and away from incompatible materials. Store and use away from heat, sparks, open flame, or any other ignition source. Store according to applicable codes or regulations for liquefied pressurized gases as applicable to: cylinders, vessels, piping, building, rooms, cabinets, allowable quantities and minimum storage distance. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers) and flammable gas detectors. Storage pressure vessels should be above ground and dike. Keep

cylinders secure while in storage or in transportation.

See Section 8: Exposure Controls/Personal Protection for appropriate Personal Protective Equipments. See Section 10 for information on Incompatibilities

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 system 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 protective equipment may also be required. Personal protective equipment should not be considered a long-term solution to exposure control. Persons in ill health where such illness would be aggravated by exposure to product should not be allowed to work with or handle this product.

Exposure Limits

Component Name (CAS No)	Reference	TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
Ethylene (74-85-1)	ACGIH	200	230	-	-

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. Wear chemical-resistant safety footwear with good traction to prevent slipping.

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

Skin 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.

SECTION-9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance	Gas at ambient conditions, liquid under pressure	Oxidizing Properties	May react with strong oxidizing agents.
Color	Colorless	Explosive Properties	Explosion class IIB
Odor	Gassy/Aromatic	Evaporation Rate	Not Applicable
Odor Threshold	270 – 600 ppm	Solubility (water)	Negligible (131 mg/l at 25°C)
pH	Not Applicable	Relative Density at 104°C	0.5678 (water=1)
Boiling Point/Boiling Range	-103.77°C	Partition Coefficient (Octanol/Water Log Pow)	1.13
Melting Point	-169.15°C	Viscosity	1.06 cSt at -170°C
Flash Point	-136°C	Evaporation	Immediate at 20°C
Auto-ignition	450 ~ 490°C	Relative Vapor Density	0.975 (air=1)
Flammable Classification	3F	Additional Physical and Chemical properties	No additional information available
Lower Flammable (explosion) Limit	2.7%		
Upper Flammable (explosion) Limit	36%		

SECTION-10. STABILITY AND REACTIVITY

Chemical Stability	: This product is moderately reactive, and may polymerize, decompose, or become self-reactive under certain conditions of shock, high temperatures, high pressures, or contamination.
Possibility of Hazardous reaction & Hazardous Polymerization	: Hazardous polymerization can occur at elevated temperature and pressure in the presence of a catalyst
Conditions to Avoid	: Keep away from heat, spark, or open flame.
Substances 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	: Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.
Special Remarks	: Vapors may form an explosive mixture with air. May polymerize explosively when heated or involved in a fire. May react vigorously with oxidizing agents. Liquefied gas may explode on contact with hot water (45°C – 75°C).

SECTION-11. TOXICOLOGICAL INFORMATION

Acute Toxicity	: This product has not considered toxic. Ethylene gas is not irritating to the skin and eyes. The liquefied form will cause freezing burns (frostbite) to the eyes and skin. At very high exposures, ethylene gas produces an aesthetic effect. Excessive exposures may cause headache, muscular weakness, dizziness, nausea, loss of condition and in extreme conditions coma and possibly death. High concentrations may trigger heartbeat irregularities. Excessive amounts in the air in a enclosed space will decrease the amount of oxygen and may cause asphyxiation.
4h inhalation-rat LC50	: >57,000ppm
Repeated Dose Toxicity	: Ethylene is relatively inactive biologically and essentially non-toxic; therefore, the major hazard is the exclusion of an adequate supply of oxygen to the lungs. Inhalation of ethylene by Sprague Dawley rats, in concentrations of 0, 300, 1000, 3000 and 10,000 ppm, 6 hours/day, 5 days/week for 14 weeks, were not found to cause any toxic effects.
Chronic Toxicity Carcinogenicity	: ACGIH – A4 – Not Classifiable as a Human Carcinogen OSHA - / IARC - Group 3 – Not classifiable as to its carcinogenicity to humans NTP - /
Special Remarks on Other Toxic Effect on Humans	: Ethylene is a simple asphyxiate. Oxygen levels should maintained at greater than 19.5 percent at normal atmospheric pressure. High concentrations of ethylene to exclude an adequate supply of oxygen to the lung causes dizziness, deeper breathing due to air hunger, possible nausea and eventual unconsciousness

SECTION-12. ECOLOGICAL INFORMATION

Eco toxicity – Acute Toxicity	: Fish: LC50: 126.012 mg/l 96 h Daphnia magna: LC/EC50 62.482 mg/l 48 h Green algae: EC50 30.327 mg/l 96 h
Mobility	: Gas at ambient conditions
Persistence and Degradability Air	: Ethylene (gas) is degraded by ozone, nitrate radicals, or photo chemically produced hydroxyl radicals. The lifetime of ethylene in the atmosphere ranges from 0.4 to 4 days, and is strongly dependent on the amount of sunlight. BioHCwin v1.01 predicts that the half-life of ethylene will be 2.905 days on the basis of the presence of an alkenyl hydrogen functional group

Soil	:	Gas may permeate through
Water	:	Ethylene may oxidize to ethylene oxide in soil and water. Volatilization is the major environmental process in soil and water. Product is highly volatile and will partition rapidly to air on release to land or water. Product is largely insoluble in water, and evaporated rapidly from surface soils and water.
Bioaccumulation Potential	:	Bio concentration potential is low. Long Pow is 1.13 (ethylene)
Biodegradation Potential	:	Biodegradation, hydrolysis, bio concentration, and adsorption are not major process for ethylene. Pure culture studies suggest that ethylene could be susceptible to microbial degradation.
Environmental Adverse Effects	:	Not toxic. This product is not consider harmful to aquatic life, and has limited absorption into soil and sediment. Ethylene is a natural plant hormone produced by plants at all stages of growth in varying amounts. Terrestrial plants such as fruit, flowers and nursery stock show diverse effect from ethylene exposure. For example, grasses and grassy vegetable such as lettuce are resistant to ethylene. However, several species of flowers (orchids, carnations, etc), and vegetables such as tomatoes, potatoes, peppers, beans and pears are sensitive to ethylene exposure. Under certain conditions, emissions may contribute to photochemical formation of ground level ozone and possible smog formation.

SECTION-13. DISPOSAL CONSIDERATIONS

Waste Disposal

The use, mixing or processing of this product may alter this product. Since emptied containers retain product, material residue, follow safe handling/label warnings even after container was been emptied. **DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED IGNITION.**

See Section 7: Handling and Storage and Section 8: Exposure controls/Personal Protection for additional handling information that may be applicable for safe handling and the protection of employees.

Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste

SECTION-14. TRANSPORT INFORMATION

UN Number	1038	
UN Proper Shipping name	Ethylene, Refrigerated Liquid	
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)
Packing Group	None	
Marine Pollutant	No	

SECTION-15. REGULATORY INFORMATION

Regulatory Information : PERMENLH RI No. 3 Year 2008: Tata Cara Pemberian Simbol dan Label Bahan Berbahaya dan Beracun.
 PERMENPERIN RI No. 87/M-IND/PER/9/2009: Sistem Harmonisasi Global Klasifikasi dan Label pada Bahan kimia.
 KEPMENAKER 187/Men/1999 Pengendalian Bahan Kimia Berbahaya


SECTION-16. OTHER INFORMATION

Training Advice : Personnel 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. Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose.

NFPA Hazard Rating for Ethylene

	Health-1	Exposure would cause irritation with only minor 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 Int'l Carriage of Dangerous Goods by inland Waterways
- ADR** : European Agreement concerning the Int'l 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
- PSHA** : Occupational Safety and Health Administration
- RID** : International Rule for Transportation of Dangerous Substance by Railway
- TLV** : Threshold Limit Value
- TWA** : Time Weighted Averages

THE INFORMATION EXPRESSED HEREIN IS THOSE OF QUALIFIED CURRENT KNOWLEDGE AND EXPERIENCE AND THAT THE INFORMATION IS SUFFICIENT OF ALL CASES. USERS SHOULD CONSIDER THE DATA AS A SUPPLEMENT TO OTHER INFORMATION AND SHOULD MAKE INDEPENDENT DETERMINATION OF ITS SUITABILITY, THEIR EMPLOYEES AND CUSTOMERS AND OF THE ENVIRONMENTAL PROTECTION TO ASSURE PROPER USE AND DISPOSAL OF THE MATERIAL. RESPONSIBILITY FOR USAGE, STORAGE, HANDLING AND DISPOSAL OF THE PRODUCTS DESCRIBED HEREIN, WHETHER ALONE, OR IN COMBINATION WITH ANY OTHER SUBSTANCE, IS THAT OF THE PURCHASER AND/OR END-USER. CAP MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULT TO BE OBTAINED FROM THE USE THEREOF. CAP ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.