SAFETY DATA SHEET

ETHYLENE

Lotte Chemical Titan (M) Sdn Bhd

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	ETHYLENE
Chemical Name	Ethylene
Synonyms	Ethene, C2H4
Proper shipping name	ETHYLENE
Chemical formula	C2H4
Other means of identification	Not Available
CAS number	74-85-1
EC Substance Name	[200-815-3] ethylene

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Large volume monomer for polyethylene plastic production. Raw material for ethylene oxide, ethylene and polyethylene glycol manufacture. Ethylene gas has been used to ripen green picked fruit; but a non flammable mixed gas of carbon dioxide 94%, ethylene 6% (by weight) is preferred. Fuel gas for welding, brazing, metal cutting. Orchard spray to control flowering of pineapples.

Details of the Manufacturer/Importer

Registered company name	Lotte Chemical Titan (M) Sdn Bhd
Address	PLO 312, Jalan Tembaga 4, Pasir Gudang Industrial Estate, 81700 Pasir Gudang, Johor, Malaysia
Telephone	+607 253 8888
Fax	+607 251 0784
Website	www.lottechem.my
Email	mcchan@lotte.net

Emergency Telephone Number

Association / Organization	Not Available
Emergency telephone numbers	+607 253 8888 Ext: 8654 (Office hours only) Ext: 3118/3128 (24 hours)

SECTION 2 HAZARDS IDENTIFICATION

Classification of the Substance

CLASS Classification	Flammable Gas Category 1, Gas under Pressure (Liquefied gas), STOT - SE (Narcosis) Category 3

Label Elements

CLASS label elements	
SIGNAL WORD	**DANGER**

Hazard Statement(s)

H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H336	May cause drowsiness or dizziness

Precautionary Statement(s) Prevention

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P271	Use only outdoors or in a well-ventilated area.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.

Precautionary Statement(s) Response

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P312	Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P381	Eliminate all ignition sources if safe to do so.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Precautionary Statement(s) Storage

P405	Store locked up.
P410+P403	Protect from sunlight. Store in a well-ventilated place.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.

Precautionary Statement(s) Disposal

P501	Dispose of contents/container to authorized chemical landfill or if organic to high temperature incineration.

SECTION 3 COMPOSITIONS / INFORMATION ON INGREDIENTS

Substances

CAS No	%[weight]	Name	CLASS Classification
74-85-1	>99	ethylene	Flammable Gas Category 1, Gas under Pressure (Liquefied gas), STOT - SE (Narcosis) Category 3; H220, H280, H336

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	▸ If product comes in contact with eyes remove the patient from gas source or contaminated area. ▸ Take the patient to the nearest eye wash, shower or other source of clean water. ▸ Open the eyelid(s) wide to allow the material to evaporate. ▸ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ▸ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ▸ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ▸ Transport to hospital or doctor. ▸ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ▸ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ▸ Ensure verbal communication and physical contact with the patient. **DO NOT** allow the patient to rub the eyes **DO NOT** allow the patient to tightly shut the eyes **DO NOT** introduce oil or ointment into the eye(s) without medical advice **DO NOT** use hot or tepid water.
Skin Contact	If skin or hair contact occurs: ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	▸ Following exposure to gas, remove the patient from the gas source or contaminated area. ▸ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ▸ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ▸ If the patient is not breathing spontaneously, administer rescue breathing. ▸ If the patient does not have a pulse, administer CPR. ▸ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ▸ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ▸ Keep the patient warm, comfortable and at rest while awaiting medical care. ▸ **MONITOR THE BREATHING AND PULSE, CONTINUOUSLY.** ▸ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.
Ingestion	Not considered a normal route of entry.

Indication of any immediate medical attention and special treatment needed

For gas exposures:

BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures.

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.
EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

	DO NOT EXTINGUISH BURNING GAS UNLESS LEAK CAN BE STOPPED SAFELY: **OTHERWISE: LEAVE GAS TO BURN.** **FOR SMALL FIRE:** ▸ Dry chemical, CO2 or water spray to extinguish gas (only if absolutely necessary and safe to do so). ▸ **DO NOT** use water jets. **FOR LARGE FIRE:** ▸ Cool cylinder by direct flooding quantities of water onto upper surface until well after fire is out.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result For ethyleneIn view of its low toxicity, no TLV has been recommended; however, it is a simple asphyxiant as a result of lowering available oxygen concentrations. It should be noted that the major vapour hazard relates to its flammable and explosive nature.

Advice for firefighters

Fire Fighting	FOR FIRES INVOLVING MANY GAS CYLINDERS: ▸ To stop the flow of gas, specifically trained personnel may inert the atmosphere to reduce oxygen levels thus allowing the capping of leaking container(s). ▸ Reduce the rate of flow and inject an inert gas, if possible, before completely stopping the flow to prevent flashback. ▸ **DO NOT extinguish the fire until the supply is shut off** otherwise an explosive re-ignition may occur. ▸ If the fire is extinguished and the flow of gas continues, used increased ventilation to prevent build-up, of explosive atmosphere.
Fire/Explosion Hazard	▸ HIGHLY FLAMMABLE: will be easily ignited by heat, sparks or flames. ▸ Will form explosive mixtures with air ▸ Fire exposed containers may vent contents through pressure relief valves thereby increasing fire intensity and/ or vapour concentration. ▸ Vapours may travel to source of ignition and flash back. ▸ Containers may explode when heated - Ruptured cylinders may rocket ▸ Fire may produce irritating, poisonous or corrosive gases.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	▸ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used. ▸ **DO NOT** enter confined spaces where gas may have accumulated. ▸ Shut off all sources of possible ignition and increase ventilation.
Major Spills	▸ **DO NOT** touch the spill material ▸ Clear area of all unprotected personnel and move upwind. ▸ Alert Emergency Authority and advise them of the location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear full body clothing with breathing apparatus.

	Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▸ Consider use in closed pressurized systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal. ▸ The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines. ▸ Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended. ▸ Before connecting gas cylinders, ensure manifold is mechanically secure and does not containing another gas.
Other information	▸ Outside or detached storage is preferred. ▸ Store below 38 deg C. ▸ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Ensure the use of equipment rated for cylinder pressure. ▸ Ensure the use of compatible materials of construction. ▸ Valve protection cap to be in place until cylinder is secured, connected. ▸ Cylinder must be properly secured either in use or in storage.
Storage incompatibility	Ethylene ▸ may react violently with oxidisers, halogen acids ▸ may polymerise explosively in the presence of chlorine compounds and sunlight or UV light ▸ is incompatible with acids, halocarbons, lithium nitric oxides, aluminium chloride, bromotrichloromethane, carbon tetrachloride, chorine, chlorine dioxide, chlorotrifluorethylene, copper, hydrogen bromide, nitrogen dioxide, ozone, polyethylene, tetrafluoroethylene, trifluorohypofluorite ▸ attacks cast iron ▸ may generate electrostatic charges due to low conductivity ▸ The various oxides of nitrogen and peroxyacids may be dangerously reactive in the presence of alkenes. BRETHERICK L.: Handbook of Reactive Chemical Hazards ▸ Avoid reaction with strong Lewis or mineral acids. ▸ Reaction with halogens requires carefully controlled conditions. ▸ Free radical initiators should be avoided.

PACKAGE MATERIAL INCOMPATIBILITIES

Not Available

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US ACGIH Threshold Limit Values (TLV)	ethylene	Ethylene	200 ppm	Not Available	Not Available	TLV® Basis: Asphyxia

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ethylene	Ethylene	600 ppm	6600 ppm	40000 ppm

Ingredient	Original IDLH	Revised IDLH
ethylene	Not Available	Not Available

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Personal protection	
Eye and face protection	Safety glasses with side shields Chemical goggles. Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	Protective gloves eg. Leather gloves or gloves with Leather facing When handling sealed and suitably insulated cylinders wear cloth or leather gloves.
Body protection	See Other protection below
Other protection	The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton. Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost. BRETHERICK: Handbook of Reactive Chemical Hazards.
Thermal hazards	Not Available

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Colourless, compressed, highly flammable gas, sweet ethereal odour taste. Slightly soluble in water= 12% @ 20 C		
Physical state	Liquefied Gas	**Relative density (Water = 1)**	Not Available
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	450
pH (as supplied)	Not Applicable	**Decomposition temperature**	Not Available
Melting point / freezing point (°C)	-169	**Viscosity (cSt)**	Not Applicable
Initial boiling point and boiling range (°C)	-104	**Molecular weight (g/mol)**	28.05
Flash point (°C)	-104	**Taste**	Not Available
Evaporation rate	Very Fast	**Explosive properties**	Not Available
Flammability	HIGHLY FLAMMABLE.	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	36	**Surface Tension (dyn/cm or mN/m)**	Not Available
Lower Explosive Limit (%)	2.7	**Volatile Component (%vol)**	100
Vapour pressure (kPa)	UNDER PRESSURE	**Gas group**	IIB
Solubility in water (g/L)	0.131 g/L (25°C)	**pH as a solution**	Not Applicable
Vapour density (Air = 1)	0.98	**VOC g/L**	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Unstable in the presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATIONS

Information on toxicological effects

Inhaled	The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of the material, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.
Ingestion	Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments
Skin Contact	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn). Not considered to be a risk because of the extreme volatility of the gas.
Chronic	Principal route of occupational exposure to the gas is by inhalation. There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
ethylene	**TOXICITY** Oral (mouse) LD50: 950000 ppm/4H [1] Inhalation (rat) LC50: 57000 ppm/4H [2] **IRRITATION** Not Available
Legend:	*1. Value obtained from OECD SIDS* *2. Value obtained from ECHA*

ETLYLENE	Studies show that ethylene has low toxicity in humans, although there are reports of increased miscarriage rates in women working in the petrochemical industry. It is unclear whether ethylene was responsible. Animal and human testing has shown that ethylene is converted in the body to ethylene oxide, which causes cancer and genetic damage. Animal testing shows that ethylene causes liver toxicity to rats pretreated with polychlorinated biphenyl (PCB).

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✓
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✓ *– Data required to make classification available*
✗ *– Data available but does not fill the criteria for classification*
⊘ *– Data Not Available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

for Ethylene: Half-life (hr) air: 7.2; BOD5: 0.83; COD: 1.27; ThOD: 2.49.
Atmospheric Fate: Ethylene is released mainly into the atmospheric compartment. A lifetime of 1.45 days has been calculated for ethylene in the atmosphere. These is little environmental hazard to organisms in this compartment.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
ethylene	LOW (Half-life = 56 days)	LOW (Half-life = 2.33 days)

Bioaccumulative potential

Ingredient	Bioaccumulation
ethylene	LOW (BCF = 4)

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL INFORMATIONS

Waste treatment methods

Product/Packaging Disposal	Evaporate or incinerate residue at an approved site. Return empty containers to supplier. Ensure damaged or non-returnable cylinders are gas-free before dispose as permitted by local regulations

SECTION 14 TRANSPORT INFORMATIONS

Labels Required

	
Marine Pollutant	NO
HAZCHEM	2SE

Land transport (UN)

UN number	1962
Packing group	Not Applicable
UN proper shipping name	ETHYLENE
Environmental hazard	No relevant data
Transport hazard class(es)	Class: 2.1 Subrisk: Not Applicable
Special precautions for user	Special provisions: Not Applicable Limited quantity: 0

Air transport (ICAO-IATA / DGR)

UN number	1962
Packing group	Not Applicable
UN proper shipping name	Ethylene
Environmental hazard	No relevant data
Transport hazard class(es)	ICAO/IATA Class: 2.1 ICAO / IATA Subrisk: Not Applicable ERG Code: 10A
Special precautions for user	Special provisions: A1 Cargo Only Packing Instructions: 200 Cargo Only Maximum Qty / Pack: 150 kg Passenger and Cargo Packing Instructions: Forbidden Passenger and Cargo Maximum Qty / Pack: Forbidden Passenger and Cargo Limited Quantity Packing Instructions: Forbidden Passenger and Cargo Limited Maximum Qty / Pack: Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	1962
Packing group	Not Applicable
UN proper shipping name	ETHYLENE
Environmental hazard	Not Applicable
Transport hazard class(es)	IMDG Class: 2.1 IMDG Subrisk: Not Applicable
Special precautions for user	EMS Number: F-D , S-U Special provisions: Not Applicable Limited Quantities: 0

SECTION 15 REGULATORY INFORMATIONS

Safety, health and environmental regulations / legislation specific for the substance or mixture

ethylene(74-85-1) is found on the following regulatory lists	"International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs"

This safety data sheet is in compliance with the Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013 (CLASS).

SECTION 16 OTHER INFORMATION

Revision Date: 01/04/2021

This information supplied has been based upon the current level of information available, for the purpose of specifying the requirements regarding environment, health and safety in conjunction with the product. They are not to be interpreted as a warranty for specific product characteristics.

LOTTE CHEMICAL TITAN (M) SDN. BHD. make no representations or warranties and there are no conditions with respect to the accuracy, reliability, or application of the information herein, its products or the safety or suitability thereof, or results obtained, whether expressed or implied including, without limitation, any implied warranty or merchantability or fitness for a particular purpose. Buyers and users must determine the results to be obtained from the application of the information herein and the safety and suitability of LOTTE CHEMICAL TITAN (M) SDN. BHD. products, whether or not occasioned by LOTTE CHEMICAL TITAN (M) SDN. BHD. negligence or based on strict product liability. LOTTE CHEMICAL TITAN (M) SDN. BHD. neither assumes nor authorizes any person to assume for it any liability in connection with the use of the information herein or its products.