Safety Data Sheets (SDS)

SECTION 1-IDENTIFICATION

Product name: Ethylbenzene

Other names: ─

Proper shipping name: Ethylbenzene

Recommended use of the chemical and restrictions on use:
The main use of ethylbenzene is to manufacture styrene, a compound used to make plastics. Ethylbenzene is also found in gasoline, paints, inks, insecticides, carpet glues and tobacco products.

Manufacturer/Supplier Name: Taiwan SM Corp., Kaohsiung plant
Address: NO.7, Industrial 1st Rd, Lin-Yuan Kaohsiung County 83203, Taiwan, R.O.C.
Phone No.: 886-7-6414511

Emergency phone No./Fax No.: 886-7-6414511 Ext. 221 (on duty), 886-7-6410402 (off duty)/886-7-6423828

SECTION 2-HAZARDS IDENTIFICATION

GHS Classification:

Flammable Liquid Category 2
Acute Toxicity (Inhalation) Category 4
Skin Corrosion/Irritation Category 3
Serious Eye Damage/Eye Irritation Category 2
Carcinogenicity Category 2
Reproductive Toxicity Category 2
Specific Target Organ Toxicity Repeated Exposure Category 2
Aspiration Hazard Category 1

GHS Label elements:

Hazard symbols

Signal word

Danger

Hazard statements

Flammable liquid and vapor
Harmful if inhaled
Causes skin irritation
Causes serious eye irritation
Suspected of causing cancer
May damage the unborn child
May be harmful to organs by prolonged and repeated exposure
May be fatal if swallowed and enters airways

Precautionary statements

Use only in well ventilated area.
Control of exposure by mechanical ventilation in an unventilated or confined space
Avoid breathing vapors and contact with skin and eyes.
Wear breathing apparatus/protective gloves/face protection.
Store in well-ventilated place.
Disposal must be in accordance with applicable federal, state, or local regulations.

Other hazards: ─

SECTION 3-COMPOSITION/INFORMATION ON INGREDIENTS

CAS No.	Chemical Name	wt% by weight	EINECS No.
00100-41-4	Ethylbenzene	99.0 min.	202-849-4
Synonyms	Phenylethane、EB、Ethylbenzol		

SECTION 4-FIRST AID MEASURES

Description of necessary first aid measures

Eye:

1. Flush eye with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.
2. Get medical aid immediately.

Skin:

1. Washing affected area thoroughly with soap and water for at least 20 minutes.
2. Call a Physician if irritation develops or persists.
3. Removing contaminated clothing, shoes, and leathery wearings, cleaning procedure is available before reused or waste treatment.

Ingestion:

1. If victim is conscious and alert, give 2～4 cupfuls of milk/water to dilute the substance in stomach.
2. Never give anything by mouth to an unconscious person.
3. Don't induce vomiting unless directed to do so by medical person.
4. Then seek for medical attention.

Inhalation:

1. Remove from further exposure and flush thoroughly with air.
2. If not breathing, give artificial respiration. If breathing is difficult, give Oxygen.
3. If respiratory irritation, seek immediate medical assistance and call a physician.

Most important symptoms/effects, acute and delayed

Headaches, dizziness, fatigue, eye, nose and throat irritation. Target organs: Eyes, upper respiratory system, skin, CNS, lung, liver, kidney, skin (dermatitis), eye (conjuntivitis and other eye injuries), upper respiratory system disorders, and central nervous system disorders.

Indication of immediate medical attention and special treatment needed, if necessary

For acute or short term repeated exposures to Ethylbenzene:

Inhalation:

1. Severe exposures should have cardiac monitoring to detect arrhythmia.
2. If bronchospasm and wheezing occur, consider treatment with inhaled sympathomimetic agents.
3. If pulmonary edema (noncardiogenic) occurs, then maintain ventilation and oxygenation with close arterial blood gas monitoring. Early use of PEEP and mechanical ventilation may be needed to maintain pO2 greater than 50 mmHG with FIO2 less than 60%.

Ingestion:

1. Induction of emesis is not recommended.
2. Cautious gastric lavage followed by administration of activated charcoal may be of benefit if the patient is seen soon after the exposure.

SECTION 5-FIRE FIGHTING MEASURES

Extinguishing media

Foam、CO_2、Dry chemical powder、Water spray or fog – Large fires only.

Specific hazards arising from the chemical

1. Liquid and vapor are flammable.
2. Moderate fire hazard when exposed to heat or flame.
3. Vapor forms an explosive mixture with air.
4. Moderate explosion hazard when exposed to heat or flame.
5. Vapor may travel a considerable distance to source of ignition.
6. Heating may cause expansion or decomposition leading to violent rupture of containers.
7. On combustion, may emit toxic fumes of carbon monoxide (CO).

Special protective equipment and precautions for fire-fighters

1. Must wear MSHA/NOISH approved positive self-contained breathing apparatus（SCBA）and protective clothing.
2. Withdrawing and isolation the possible dangerous sources, fire fighting at safe distance and suitable protection area. Keep toxic vapors and decompositions away from inhalation, when standing at upper-wind area as well.
3. Stop leakage before fire extinguishing, otherwise it may explode again because of vapors above leakage. However, it's not well extinguishment at nondangerous circumstance, preferring to burning up.
4. Water spray may not work effectively in terms of lower flash point. Better fire fighting performed by experienced people.
5. In huge fire at larger area, automatic water spray system should be recommended. If extinguishing is not available, evacuating people back as soon as possible.
6. Out off the space immediately, if vessel collapsed or pressure relief valve went pop.

SECTION 6-ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedure

1. Personal protective equipment (specified in Section 8)
   Eyes : Chemical safety goggles are recommended, and a face shield is added when needed.
   Skin : Wear appropriate protective gloves to avoid skin contact.
   Clothing : When direct contact is likely, Use rubberized clothings, apron and boots.
   Respiratory : When limits are exceeded, wear a respirator approved by NIOSH/MSHA for protection against organic dust, mists and vapors.
2. Remove all sources of ignition. No smoking, naked lights or ignition sources. Ventilate area of leak or spill.
3. Keep unnecessary and unprotected personnel from entering. Evacuate personnel from the danger area. Consult with an expert about the emergency procedures.

Environmental precautions

1. Prevent spillage from entering drains, surface, and groundwater.
2. Contain and recover liquid when possible. Use non-sparking tools and equipment.
3. Collect liquid in an appropriate container or absorb with an inert material (e.g. vermiculite, dry sand, earth), and place in a chemical waste container.
4. Report the accidental spill/release to Local/State government.

Methods and materials for containment and cleaning up

Minor spill:

1. Remove all ignition sources.
2. Clean up all spills immediately.
3. Avoid breathing vapors and contact with skin and eyes.
4. Control personal contact by using protective equipment.
5. Contain and absorb small quantities with vermiculite or other absorbent material.
6. Wipe up.
7. Collect residues in a flammable waste container.

Major spill

1. Clear area of personnel and move upwind.
2. Alert emergency responders and tell them location and nature of hazard.
3. May be violently or explosively reactive.
4. Wear breathing apparatus plus protective gloves.
5. Prevent spillage from entering drains or water course.
6. No smoking, naked lights or ignition sources. Increase ventilation.
7. Stop leak if safe to do so.
8. Water spray or fog may be used to disperse/absorb vapor.
9. Contain spill with sand, earth or vermiculite.
10. Use only spark-free shovels and explosion proof equipment.
11. Collect recoverable product into labeled containers for recycling..
12. Absorb remaining product with sand, earth or vermiculite.
13. Collect solid residues and seal in labeled drums for disposal.
14. Wash area and prevent runoff into drains.
15. If contamination of drains or waterways occurs, advise emergency services.

SECTION 7-HANDLING AND STORAGE

Precautions for safe handling

1. Wash thoroughly after handling.
2. Use only in well ventilated area.
3. Ground and bond containers when transferring.
4. Use spark-free tools and explosion proof equipment.
5. Empty containers retain product residue (liquid/vapor), and can be dangerous.
6. Do not pressurize, cut, weld, braze, solder, drill, or expose empty containers to heat, sparks or open flames.

Conditions for safe storage, including any incompatibilities

1. Iron, galvanized iron, and steel are suitable metals for tanks.
2. Storage should be located away from any area subject to fire hazards. Storage tanks located in the open or underground minimize the danger of fire, vapor and health problems.
3. All openings in the system should terminate outdoors and be protected by flash screen.
4. Electrical installation should conform to the National Electrical Code.
5. Storage tanks should be electrically bonded and grounded to prevent dangerous accumulations of static electricity. (see NFPA pamphlet “Static Electricity”)
6. Natural ventilation is all that is needed for outdoor storage installation.
7. For indoor storage : Good natural ventilation may be sufficient. The generally considered maximum allowable concentration is 100 ppm by volume in air for an eight-hour working exposure. If other than natural ventilation is required,

the ventilation equipment should be designed to handle the heavy ethylbenzene vapor. Since ethylbenzene vapor is heavier than air, a down draft mechanical exhaust is indicated in those operation in which general ventilation should be to ensure a substantial air flow away from the work area. All ventilating systems require periodic inspection.

SECTION 8-EXPOSURE CONTROLS, PERSONAL PROTECTION

Control parameters

OSHA- Final PELs : 100 ppm TWA.
ACGIH TLV-TEL : 100 ppm.
ACGIH TLV-STEL : 125 ppm.
Taiwan TWA : 100 ppm (skin).
Taiwan STEL : 125 ppm (skin).
Taiwan Ceiling : -------.
Taiwan BEI : 1 mg/l (before on duty).

Engineering control

1. Process should be located at least 17 meter (50 feet) away from open flames and all high temperature operations likely to cause ignition of the ethylbenzene vapor.
2. In venting ethylbenzene vapors, consideration should be given to possible halogenation of the vapors by low concentrations of free chlorine and bromine with the resultant formation of lacrimations.
3. Process should be designed so that the operator is not exposed to direct contact with ethylbenzene or the vapor. The technical problems of designing equipment, providing adequate ventilation and operating procedures which promise maximum security and economy, can best be handled by competent engineers.
4. It is essential for safety that equipment be used and maintained as recommended by the manufacturer.
5. Tanks used to store or process ethylbenzene should be closed vessels vented to a safe point of discharge in the outside atmosphere away from operating stations, roadways, and at least 17 meter (50 feet) from possible sources of ignitions. All sparks, flames, heated surface, or other sources of ignition should be kept away from all vents. It is advisable, to provide suction on vessels when inspection or observation openings are made, to minimize or eliminate escape of vapors.

Personal protective equipment

Personal respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.
(Warning: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.)

Skin protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Transparent liquid	Upper/lower explosive limits : 1.0%～6.7%
Odor: Aromatic odor	Vapor Pressure : 7.1 mmHg @20℃/68℉
Odor threshold : 0.092～0.6 ppm	Vapor Density : 3.66 (air=1)
PH : Not available	Relative density : 0.864 (water=1)
Melting/Freezing Point : －94.9℃	Solubility : 0.015 @25℃ in water
Initial boiling point/boiling range : 132.6℃	Partition coefficient : 3.15 (n-octanol/water)
Flash point : 21℃	Auto-ignition temperature : 432℃
Evaporation Rate : 0.84 (BuAc=1)	Decomposition temperature : Not available
Flammability (solid/gas) : Not available	Viscosity : Not available
Molecular Formula : C_8H_{10}	Molecular Weight : 106.7

SECTION 10-STABILITY AND REACTIVITY

Reactivity

The product is stable. Vapor is explosive when exposed to heat or flame.

Chemical stability

Stable under normal temperatures and pressures.

Possibility of hazardous reaction

Has not been reported.

Condition to avoid
Incompatible materials, ignition sources, excess heat.

Incompatible materials
Oxidizing agents.

Hazardous decomposition products
Carbon dioxide and carbon monoxide may form when heated to decomposition.

SECTION 11-TOXICOLOGICAL INFORMATION

Routes of exposure
Eye, Skin, inhalation, Ingestion.

Symptoms (treatments as indicated in Section 4)
Eye:
May cause irritation, redness, pain, and corneal damage.

Skin:
Causes irritation to skin. Symptoms include redness, itching, and pain. May produce blisters. May be absorbed through the skin.

Ingestion:
May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. May cause central nervous system depression. Symptoms may include giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.

Inhalation:
Inhalation of high concentrations of gas/vapor causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination. Central nervous system (CNS) depression may include general discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.

Chronic exposure:
There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes.

Aggravation of pre-existing conditions:
Persons with pre-existing skin disorders, eye problems, liver disease, central nervous system disorders, or impaired respiratory function may be more susceptible to the effects of the substance.

Toxicity
LD50: 3500 mg/kg (rat, oral)
LC50: 4000 ppm/4h (rat, inhalation)

Irritation
Skin (rabbit): 15 mg/24h Mild
Eye (rabbit): 500 mg- SEVERE

Chronic effect
Carcinogenicity:
ACGIH : A3- Proven for animals.
OSHA : Classified None.
IARC : Group 2B carcinogen.

Epidemiology:
Not available.

Teratogenicity:
Not available.
Reproductive Effects:
Not available.

Neurotoxicity:
Not available

Mutagenicity:
Mutation in mammalian somatic cells（Rodent, mouse）Lymphocyte=80mg/L.

SECTION 12-ECOLOGICAL INFORMATION

Ecotoxicity

LC_{50} (96 hr.) Fish: 32.0～97.1 mg/l

EC_{50} (48 hr.) Water flea: Not available

Biocencentration factor (BCF): Not available

Persistence and degradability

1. In the atmosphere, it exists primarily in the vapor phase based on its vapor pressure. It photochemically degrades by reaction with hydroxyl radicals (half-life 0.5 to 2 days) and partially returns to the earth in rain.
2. Degradation occurs faster under smog conditions. Photooxidation products include ethylphenol, benzaldehyde, acetophenone and m- and p- ethylnitrobenzene.
3. In water, ethylbenzene's concentration decreases by evaporation and biodegradation. The rate of decrease is dependent on the season. Half-lives in water range from several days to 2 weeks.
4. Some ethylbenzene is absorbed by sediment, but bioconcentration in fish is not expected to be significant.

Half-life (Air): 8.56～85.6 hr

Half-life (Surface water): 72～240 hr

Half-life (Ground water): 144～5472 hr

Half-life (Soil): 7.2～240 hr

Bioaccumulative potential

This material is not expected to significantly bioaccumulate.

Mobility in soil

Ethylbenzene is adsorbed moderately by soil. It does not significantly hydrolyze in either water or soil.

Other adverse effects: —

SECTION 13-DISPOSAL CONSIDERATIONS

Residues and spilled material are hazardous waste due to ignitability. Disposal must be in accordance with applicable federal, state, or local regulations.

The container for this product can present explosion or fire hazards, even when emptied. To avoid risk of injury, do not cut, puncture, or weld on or near this container. Since the emptied containers retain product residue, follow label warnings even after container is emptied.

SECTION 14-TRANSPORTATION INFORMATION

US DOT	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	UN Number	1175		
	Packing Group	II		
Sea(IMO/IMDG)	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3.2		
	UN Number	1175		
	Packing Group	II		
Air(ICAO/IATA)	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	Subsidiary Class	1175		
	Packing Group	II		

EUROPEAN RID/ADR (ADR/RID)	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	UN Number	1175		
Canadian TDG	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	UN Number	1175		
	Packing Group	II		
	Subsidiary Class	9.2		

SECTION 15-REGULATORY INFORMATION

US FEDERAL

TSCA

CAS# 100-41-4 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 100-41-4：Effective Date：June 19, 1987；Sunset Date：June 19, 1997

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

Section 302 (RQ)

CAS# 100-41-4：final RQ＝1000 pounds（454 kg）

Section 302（TPQ）

None of the chemicals in this product have a TPQ.

SARA Codes

CAS# 100-41-4：acute, chronic, flammable.

Section 313

This material contains Ethylbenzene（CAS# 100-41-4, 99.0% ）,which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act

CAS# 100-41-4 is listed as a hazardous air pollutant（HAP）.

This material does not contain any class 1 Ozone depletors.

This material does not contain any class 2 Ozone depletors.

Clean Water Act

CAS# 100-41-4 is listed as a hazardous Substance under the CWA.

CAS# 100-41-4 is listed as a Priority Pollutant under the Clean Water Act.

CAS# 100-41-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Ethylbenzene can be found on the following state right to know lists : California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level：None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols : XN F

Risk Phrases : R 11 Highly flammable.

R 20 Harmful by inhalation.

Safety Phrases : S 16 Keep away form sources of ignition-No smoking.

S 24/25 Avoid contact with skin and eyes.

S 29 Do not empty into drains.

CANADA

CAS# 100-41-4 is listed on Canada’s DSL/NDSL list.

This product has a WHMIS classification of B2, D2B.

CAS# 105-05-5 is not listed on Canada’s Ingredient Disclosure List.

SECTION 16-OTHER INFORMATION

References and sources

1. CHEMINFO Data Bank, CCINFO CD, 2005-3
2. HSDB Data Bank, TOMES PLUS CD, Vol.65,2005
3. RETECS Data Bank, TOMES PLUS CD, Vol.65, 2000
4. Hazardous Substance Data Bank, Environment Protection, Administration, Executive Yuan, ROC (Taiwan)
5. Chemwatch Data Bank, 2005-1
6. SDS, GHS in Taiwan, Council of Labor Affairs, Executive Yuan, ROC (Taiwan)

Version	Date	Remark
Version 1	06/01/1998	Original Version.
Version 2	04/20/2001	Updated 10 sections to 16 sections.
Version 3	08/01/2003	Updated “SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES”.
Version 4	01/01/2006	Updated “SECTION 14-TRANSPORTATION INFORMATION”.
Version 5	08/21/2008	Updated each section by GHS SDS.
Version 6	08/01/2011	Checked each section by SHE
Version 7	08/01/2014	Annual update
Version 8	08/01/2017	Annual update
Version 8.1	02/01/2019	Annual review
Version 9	06/15/2020	Annual update
Prepared by	Safety & Environment Protection Section, Taiwan SM Corporation Kaohsiung Plant.	