

## 1. IDENTIFICATION

### A. PRODUCT NAME

- EPS

### B. Recommended Use and Restriction on Use

- General use : Insulation, cushioning packaging, food containers, transport boxes, float
- Restriction on Use : Not applicable

### C. Information of Manufacturer

#### – Manufacturer

- Company name : Korea Kumho Petrochemical Co., Ltd.
- Address : 260-257, Cheoyong-ro, Nam-Gu, Ulsan, 44785, Korea
- Dept. : Quality Assurance Team
- Person in charge :
- Telephone number : +82-52-279-8852
- Fax number : +82-52-279-8840
- Emergency :

#### – Supplier / distributor

- Company name :
- Address :
- Dept. :
- Person in charge :
- Telephone number :
- Fax number :
- Emergency :

## 2. HAZARD IDENTIFICATION

### A. GHS Classification : Not applicable

### B. GHS label elements

- Hazard symbols : Not applicable
- Signal word : Not applicable

- Hazard statement : Not applicable
- Precautionary statements : Not applicable

C. Other hazards which do not result in classification :

- NFPA rating: (0~4 steps) : Health=0, Flammability=0, Reactivity=0

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS No./ECL No./EINECS No.	Contents(%)
Expandable polystyrene	9003-53-6/KE-13257/-	90~95
Pentane	109-66-0/KE-27968/203-692-4	3~7
Butane	106-97-8/KE-3751/203-448-7	0~2
Additives	Proprietary	0~1

※ Reference No. : ECL(Registration number of Korean Existing Chemical List)  
EINECS(Registration number of Europe Existing Chemical List)

### 4. FIRST-AID MEASURES

A. Eye Contact :

- Immediately flush eyes with plenty of water at least 15minutes.
- If irritation persists, get a doctor's examination.

B. Skin Contact :

- Wash the contaminated skin area with water or soap.
- If irritation persists, get a doctor's attention.

C. Inhalation :

- Intake the water to clean the throat and blow nose to remove the dust.
- Remove victim to fresh air immediately.
- Take Artificial respiration if not breathing.
- Give oxygen if breathing is difficult.
- Get medical attention.

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D. Ingestion :

- Rinse mouth with water.
- Give large amounts of water to relieve stimulus.
- Toxic by ingestion does not high.
- If irritation or symptoms occurs, get a doctor's examination.

E. Delay and immediate effects and also chronic effects from short and long term exposure : Not available

F. Notice to Physician :

- Treatment may vary with condition of victim and specifics of incident.

### **5. FIRE FIGHTING MEASURE**

A. Suitable (Unsuitable) extinguishing media :

- Extinguishing media : Carbon Dioxide, Dry Chemical, Water.
- Unsuitable Extinguishing media : Do not use direct water.
- Large Fire : Water spray, regular foam

B. Specific hazards arising from the chemical

- Combustion :
  - Irritating, corrosive and/or toxic gases may occur by fire.
  - Generate pyrolysis such as carbon dioxide, carbon monoxide and styrene when combustion.
- Levels of fire hazard :
  - Containers may rupture or explode if exposed.
  - Dust / air mixtures may ignite or explode.

C. Fire fighting procedures and equipments :

- Wear appropriate personal protective equipment(see section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION).
- Avoid inhalation of smoke or gas when fire fighting.
- Move container from fire area if it can be done without risk.
- Cool containers with water until well after fire is out.
- Stay upwind and keep out of low areas.

- Avoid inhalation of substance itself or combustion.

## 6. ACCIDENTAL RELEASE MEASURES

### A. Personal Precautions, Protective Equipment and Emergency procedures :

- Perform in accordance with 「See section 8 . EXPOSURE CONTROLS / PERSONAL PROTECTION」 . Put on appropriate personal protective equipment.
- Use a way to minimize dust.
- Avoid contact with eyes and skin.
- Avoid inhalation of substance itself or combustion.
- Evacuation against the wind.
- Keep unauthorized personnel out.
- Avoid contact with heat, sparks, flame or other ignition sources.

### B. Environmental Precautions

- Avoid dispersal of spilt material and runoff and contact with waterways, drains and sewers. If large spills, advise emergency services.

### C. Methods and materials for containment and cleaning up :

- For small spills.
  - Remove all sources of ignition.
  - Suppression occurrence of dust.
  - Appropriate container for disposal of spilled material collected.
  - Ventilate leak areas and clearing leak area.
- For large spills.
  - Remove all sources of ignition.
  - Suppression occurrence of dust.
  - Avoid entering to sewers or water system.
  - For disposal of spilled material in appropriate containers collected and clear surface.
  - Appropriate container for disposal of spilled material collected.

## 7. HANDLING AND STORAGE

### A. Handling :

- Perform in accordance with 「See section 8 . EXPOSURE CONTROLS / PERSONAL PROTECTION」 . Put on appropriate personal protective equipment.
- For protection of fire by static electricity, replace with air at least 5 min. and use after opening the package of product. (This product is provided as 25kg sack or 500kg bag)
- Remove all sources of ignition.
- Sources of ignition such as smoking and open flames are prohibited where this chemical is handled, used, or stored.
- Work after removing static electricity thoroughly when loading or unloading the product.

### ※ Matters that require attention on handling

- Caution: Inflammables or Use of fire strictly prohibited. (Because combustible gas volatilized from the product.)
- Caution: inhalation of gas strictly prohibited. (Blowing agent(gas) in this product has the effect of the anesthesia and suffocation.
- Handle in a well-ventilated place.
- Caution: Ignition by static electricity. Blowing agent(gas) in this product is inflammable. Be careful not to ignite by a flame caused by static electricity.

### B. Storage Precautionary Statements :

- Keep in original container and tightly closed.
- In case of storage in closed area, equip the ventilator of explosion-proof type at the bottom of building and ventilate because combustible gas what heavier than air is formed.
- In case of handling a fire at the neighboring area from storage place, Work after shut off from the product or move out of reach.
- Stored in a well-ventilated, cool and dark place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### A. Exposure limit

- Exposure limit under ISHL :
  - Expandable polystyrene : Not available
  - Pentane : TWA = 600 ppm, 1800 mg/m<sup>3</sup>  
                  STEL = 750 ppm, 2250 mg/m<sup>3</sup>
  - Butane : TWA = 800 ppm, 1900 mg/m<sup>3</sup>
- ACGIH :
  - Expandable polystyrene : Not available
  - Pentane : TWA = 600 ppm
  - Butane : TWA = (aliphatic hydrocarbon gases, Alkane C1-C4) 1000 ppm
- Biological exposure limits : Not applicable

### B. Engineering Controls

- A system of local and/or general exhaust is recommended to keep employee exposures above the Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. The use of local exhaust ventilation is recommended to control emissions near the source.

### C. Personal Protective Equipment :

- Respiratory Protection : Use the respirator be given official approval by Korea Occupational Safety & Health Agency. Under conditions of frequent use or heavy exposure, Respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.
  - Dust, mist, fume-purifying respiratory protection
  - Any air-purifying respirator with a corpuscle filter of high efficiency
  - Any respiratory protection with a electromotion fan(for dust, mist, fume-purifying)
  - ※ For Unknown Concentration or Immediately Dangerous to Life or Health
    - Self-contained breathing apparatus(pressure-demand or other positive-pressure mode in combination)
    - Supplied-air respirator with full facepiece

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- Eye Protection : Wear primary eye protection such as splash resistant safety goggles with a secondary protection faceshield. Provide an emergency eye wash station and quick drench shower in the immediate work area.
- Hand Protection : Wear chemical resistant protected gloves if there is hazard potential for direct skin contact. Wear heat resistant protected gloves to withstand the temperature of molten product.
- Body Protection : Wear chemical resistant protected clothing if there is hazard potential for direct contact.

### **9. PHYSICAL AND CHEMICAL PROPERTIES**

	Polystyrene	Pentane
A. Appearance	White beads	Transparent liquid
B. Odor	Peculiar smell	Gasoline
C. Odor threshold	Not available	Not available
D. pH	Not available	Not available
E. Melting point/Freezing point	> 140℃	-160~-130℃
F. Initial Boiling Point/Boiling Ranges	Not available	18~36℃
G. Flash point	345~360℃	-51~-49℃
H. Evapourating Rate	Not available	5.7
I. Flammability(solid, gas)	Not available	Not available
J. Upper/Lower Flammability or explosive limits	Not available	1.4~7.8%
K. Vapour pressure	Not available	426~595mmHg (@ 21℃)
L. Solubility	Not available	0~0.04%
M. Vapour density(Air=1)	Not available	Not available
N. Relative density	1.04~1.05	0.6201~0.6262
O. Partition coefficient of n-octanol/water	Not available	Not available
P. Autoignition Temperature	488~496℃	260℃
Q. Decomposition Temperature	Not available	Not available
R. Viscosity	Not available	Not available

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S. Molecular weight	> 100,000	72.15
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## 10. STABILITY AND REACTIVITY

### A. Stability

- This material is stable under recommended storage and handling conditions

### B. Possibility of Hazardous Reaction

- Will not occur.

### C. Conditions to Avoid

- Avoid contact with heat, sparks, flame or other ignition sources.

### D. Materials to Avoid

- Strong oxidizing agents, Combustible materials.

### E. Hazardous Decomposition Products

- Generate carbon monoxide, carbon dioxide, flammable vapors, black smoke.

## 11. TOXICOLOGICAL INFORMATION

### A. Information on the likely routes of exposure

- (Respiratory tracts) : Not applicable
- (Oral) : Not applicable
- (Eye · Skin) : Not applicable

### B. Delayed and immediate effects and also chronic effects from short and long term exposure

- Acute toxicity :
  - Acute oral toxicity
    - Expandable polystyrene : Not available
    - Pentane : LD50(rat) > 2,000 mg/kg
    - Butane : Not available
  - Acute dermal toxicity : Not available



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- Acute Inhalation toxicity :
  - Expandable polystyrene : Not available
  - Pentane : LC50(rat) 98,662 ppm/2hr (205.45mg/L/4hr Equivalent)
  - Butane : LC50(rat) 277,374 ppm/4hr
- Skin corrosion/irritation :
  - Expandable polystyrene : Not available
  - Pentane :

There was no stimulativeness to the human skin by the 24-hour patch test in the humans, and that there was no stimulativeness in practice by the skin irritation study in a rabbit (the erythema and dropsy with the average values of Draize score of 0.67)
  - Butane : Not available
- Serious eye damage/irritation :
  - Expandable polystyrene : Not available
  - Pentane :

Category 2B, In the eye irritation tests with the rabbits, transient conjunctivitis was admitted, however, it recovered within 72 hours (EU-RAR (2003)). So we classified it as Category 2B also based on the other descriptions.
  - Butane :

We found a statement that the eyes of the rabbits were not stimulated and the ocular irritational property was not reported as human cases of the exposure to vapor. However, we found no statement which negates hazard to human clearly. Therefore we could not classify it for the insufficiency of data.
- Respiratory sensitization : Not available
- Skin sensitization :
  - Expandable polystyrene : Not available
  - Pentane :

Maximisation Test(Guinea pig) – Negative
  - Butane : Not available
- Carcinogenicity : Not available
- Germ cell mutagenicity :
  - Expandable polystyrene : Not avai
  - Pentane :

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Micronucleus Test – Negative

· Butane :

Mutagenic test (Bacteria in vitro) – Negative

○ Reproductive toxicity :

· Expandable polystyrene : Not available

· Pentane :

There is no data of the reproductive examination using laboratory animals. However, in the 13-week repetition inhalation exposure examination using rats, the effects of administration of a substance is not observed grossly and histologically in genital tract of male and female rats in the highest exposure concentration group (20000mg/m<sup>3</sup>, 6 hours/day) (EU-RAR, 2003).

Moreover, there is a description that no influence on dam and fetus was observed in the teratogenicity test by oral administration using rats, even at the highest dose of 1000mg/kg/day

· Butane : Not available

○ Specific target organ toxicity(single exposure) :

· Expandable polystyrene : Not available

· Pentane :

Category 3 (narcotic effects, respiratory tract irritation), referring to that there were anesthetic actions and respiratory irritant through inhalation exposure to laboratory animals, referring to that there were respiratory irritant and anesthetic actions through inhalation exposure to mice.

· Butane :

Category 3 (narcotic effects), that concentrated suction indicates anesthetic actions or central nervous system depression in humans.

○ Specific target organ toxicity(repeated exposure) :

· Expandable polystyrene : Not available

· Pentane :

In the repetitive inhalation exposure test on rats (highest exposure concentrations: 6660ppm– 6 hours/day, 5 days/week for 13 weeks and 3000 ppm– 9 hours/day, 5 days/week for 30 weeks), and 16-week repetitive inhalation exposure test on rats (the highest exposure concentrations : 3000 ppm, 12 hours/day, 7 days/week), it was observed no toxicity even with the highest exposure concentrations exceeding the

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guidance value for Category 2, and in long-term repetitive exposure of high concentration n-pentane on humans, it was reported to have no effects on central nervous systems.

· Butane :

There is description that toxicity was not observed in the repeated inhalation exposure test (mixture with isobutane or pentane) using the rat. On the other hand, although it may affect the central nervous systems because of the description that the euphoria and the hallucination were observed in many of examples of repetitive inhalation exposure for the purpose of anesthesia to human, there is no other data which suggests the influence on the central nervous systems in repeated exposure, therefore we could not classify it since the lack of the data.

○ Aspiration hazard :

· Expandable polystyrene : Not available

· Pentane :

Since it is a hydrocarbon and the dynamic viscosity is 0.374mm<sup>2</sup>/s at 20 degrees C (calculated from the viscosity 0.234mPs-s, and the density of 0.62624g/cm<sup>3</sup> at 20 degrees C)

· Butane : Not available

○ Chronic effect : Not available

C. Calculation the classification of the mixture(acute toxicity estimate calculation etc.) :

The acute toxicity estimate(ATE) of the mixture is calculates from the acute toxicity values for all relevant ingredients in product according to the following formula.

$$[100-(\Sigma C_{\text{unknown if } > 10\%})]/ATE_{\text{mix}} = \Sigma C_i / ATE_i,$$

$$100(\Sigma C_{\text{unknown if } < 10\%}) / ATE_{\text{mix}} = \Sigma C_i / ATE_i$$

- Acute toxicity estimate value(Oral) :

ATE<sub>mix</sub> > 2000 mg/kg, Out of Category.

(The total concentration of the ingredients with unknown is > 10%)

- Acute toxicity estimate value(Dermal) : Not available

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- Acute toxicity estimate value(Inhalation) :  
ATEmix = 232 mg/l, Out of Category.  
(The total concentration of the ingredients with unknown is > 10%)

### **12. ECOLOGICAL INFORMATION**

#### A. Ecotoxicity :

- Acute aquatic toxicity
  - Fish : Not available
  - Invertebrate :
    - Expandable polystyrene : Not available
    - Pentane : EC50 2.7mg/L/48hr, Crustacea
    - Butane : Not available
  - Algae : Not available

#### B. Persistence and degradability

- Persistence :
  - Expandable polystyrene : Not available
  - Pentane : log Kow = 3.39 (calculated)
  - Butane : log Kow = 2.89 (calculated)
- Degradability :
  - Expandable polystyrene : Not available
  - Pentane : BOC 96%
  - Butane : Not available

#### C. Bioaccumulative potential

- Bioaccumulation :
  - Expandable polystyrene : Not available
  - Pentane : BCF = 80.12 (calculated)
  - Butane : BCF = 37.48 (calculated)
- Biodegradability : Not available

#### D. Mobility in soil :

- Expandable polystyrene : Not available

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- Pentane : log Koc = 2.9418 (calculated)
- Butane : log Koc = 2.5078 (calculated)

E. Other adverse effects : Not available

### **13. DISPOSAL CONSIDERATION**

#### A. Disposal methods

- The user of this product must properly characterize the waste/container generated from the use of this product in accordance with all applicable federal, state and/or local laws and regulations in order to determine the proper disposal of the waste in accordance with all applicable federal, state and/or local laws and regulations.

#### B. Special precautions for disposal :

- The user of this product must disposal by oneself or entrust to waste disposer or person who other' s waste recycle and dispose, person who establish and operate waste disposal facilities.
- Dispose of waste in accordance with local regulation.

### **14. TRANSPORT INFORMATION**

A. UN number : Not regulated for transport of dangerous goods.

B. Proper shipping name : Not applicable

C. Hazard class : Not applicable

D. Packing group : Not applicable

E. Marine pollutant : Pentane(all isomers)

F. Special precautions for user related to transport or transportation measures :

- 1) EmS FIRE SCHEDULE : Not applicable
- 2) EmS SPILLAGE SCHEDULE : Not applicable

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- Do not exposure this product to direct sunlight or heat because this product contains combustible gases.
- Must place the fire extinguisher to provide against fire during transportation.

G. IATA Transport : Not Classified as dangerous for IATA Transport

### **15. REGULATORY INFORMATION**

A. Korea Industry Safety and Health Law (ISHL) :

- This product is subject to the chemical for classification and labeling under ISHL Article 41.
- Korea. OELs (ISHL Article 42; MOL Public Notice No. 2008-26)
  - Pentane; 109-66-0
  - Butane; 106-97-8

B. The Toxic Chemical Control Act in Korea(TCCA)

- This product is not classified as Toxic chemical and Observational chemical under TCCA Article 2.3. and 2.4.
- Toxic Release Inventory(TRI) Chemicals :
  - [Butane; 106-97-8] : Contents > 0.1%, Handling amounts : 10ton/annual

C. Dangerous goods Safety Management Law in Korea : Not applicable

D. US regulations

- OSHA regulation (29CFR1910.119) : Not available
- CERCLA section 103 (40CFR302.4) : Not available
- EPCRA section 302(40CFR355.30) : Not available
- EPCRA section 304(40CFR355.40) : Not available
- EPCRA section 313(40CFR372.65) : Not available

E. Other local or international regulation

- POPs Management Law : Not applicable
- Rotterdam Convention on Harmful Chemicals & Pesticides : Not applicable
- Stockholm Convention on Persistent Organic Pollutants : Not applicable
- Montreal Protocol on Substances That Deplete the Ozone Layer : Not applicable

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- Information of EU Classification :
  - Pentane
    - Classification : F+, Xn, N
    - Risk Phrases : R12, R65, R66, R67, R51/53
    - Safety Phrases : S2, S9, S16, S29, S33, S61, S62
  - Butane
    - Classification : F+
    - Risk Phrases : R12
    - Safety Phrases : S2, S9, S16
- REACH Regulation (EC) No 1907/2006 : compliance

### **16. OTHER INFORMATION**

#### A. Reference

- This MSDS is prepared in accordance with ISHL Article 41 and MOL Notification No. 09-68 in Korea and consider the internal regulations by Korea Kumho Petrochemical Co., Ltd.

B. Issue date : 2010. 03. 10

C. Revision number and Last revised : 5<sup>th</sup>, 2018. 07. 19

D. Other information : Not available