

 Honam Petrochemical Corp. Lotte Tower B/D (9~11F) 395-67, Shindaebang-dong, Dongjak-gu, Seoul, Korea Tel) 82-2-829-4114 Fax) 82-2-843-1010 Homepage) www.hpc.co.kr	Material Safety Data Sheet	File No	MSDS-PE-5000ST
		Issue Date	1996.06.01
	High Density Polyethylene (HDPE)	Revision Date	2005.07.01
		Page	1/4

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

- 1) Product Name: High Density Polyethylene, GRADE: 5000ST
- 2) Company Identification
 - ① Prepared by: Honam Petrochemical Corp. Yeosu Plant
 - ② Address: 172 Chungheung-dong, Yeosu, Chullanamdo, Korea, P.O. Box 555-200
 - ③ Telephone & Fax: Tel) 82-61-688-2430, Fax) 82-61-688-2474
 - ④ Revision Date: 2005.07.01

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Component	Polyethylene	Additives
CAS No	9002-88-4	-
Composition (%)	Min 99	Max 1

SECTION 3. HAZARDS IDENTIFICATION

- 1) Appearance: White
- 2) Eye Contact: Product fines can cause mechanical irritation.
- 3) Skin Contact: Product is unlikely to cause irritation.
- 4) Inhalation: Product fines may cause mechanical irritation.
- 5) Ingestion: Product is practically non-toxic.
- 6) Signs and Symptoms: Irritation as noted above.

SECTION 4. FIRST AID MEASURES

- 1) Eye Contact: Flush eyes with water if irritation occurs.
- 2) Skin Contact: Flush skin with plenty of soap and water for at least 15 minutes, while removing contaminated clothing and shoes.
- 3) Ingestion: Do not induce vomiting. Allow the victim to rinse his mouth then to drink 2-4 cupfuls of water and seek medical advice.
- 4) Inhalation: Remove from exposure to fresh air immediately.
- 5) Notes to physician: Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

- 1) Flash Point and Method: Not Applicable
- 2) Extinguishing media: Use water fog, foam, dry chemical or CO2

 Honam Petrochemical Corp. Lotte Tower B/D (9-11F) 395-87, Shindaebang-dong, Dongjak-gu, Seoul, Korea Tel) 82-2-829-4114 Fax) 82-2-843-1010 Homepage) www.hpc.co.kr	Material Safety Data Sheet		File No	MSDS-PE-5000ST
			Issue Date	1998.06.01
	High Density Polyethylene (HDPE)		Revision Date	2005.07.01
			Page	2/4

- 3) Autoignition temperature: Not Applicable
- 4) Special fire fighting procedures and precautions: Material will not burn unless preheated.
Do not enter confined fire space without full bunker gear(helmet with face shield, bunker coats, gloves and rubber boots). Cool fire exposed containers with water.
- 5) Unusual fire and explosion hazards: Treat as a solid that can burn. Molded parts generally burn slowly with a low smoke density and flaming drips. Under certain conditions can burn with a high smoke density.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- 1) General information: Use proper personal protective equipment
- 2) Spill/leaks: Clean up spills immediately. Sweep up, then place into a suitable container for disposal.

SECTION 7. HANDLING AND STORAGE

- 1) Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.
- 2) Storage: Store in a cool, dry place. Keep container closed when not in use.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

- 1) Engineering controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.
- 2) Personal protective equipment
 - ① Eye: Wear safety glasses and chemical goggles if splashing is possible.
 - ② Skin: Wear appropriate protective gloves and clothing to prevent skin exposure.
 - ③ Clothing: Wear appropriate protective clothing to minimize contact with skin.
 - ④ Respirators: Use approved supplier air respiratory protection.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

- 1) Appearance: White
- 2) Odor: Essentially odorless pellet.
- 3) pH: Not applicable
- 4) Solubility: (In Water) Insoluble
(Other solvent) Soluble in Toluene, Xylene, Trichloroethane etc.

 Honam Petrochemical Corp. Lotte Tower B/D (9~11F) 395-67, Shindasabang-dong, Dongjak-gu, Seoul, Korea Tel) 82-2-829-4114 Fax) 82-2-843-1010 Homepage) www.hpc.co.kr	Material Safety Data Sheet		File No	MSDS-PE-5000ST
			Issue Date	1996.06.01
	High Density Polyethylene (HDPE)		Revision Date	2005.07.01
			Page	3/4

- 5) Viscosity: Not applicable
- 6) Melt point: 126 ~ 136°C
- 7) Boiling point: Not applicable
- 8) Decomposition temperature: Not applicable
- 9) Vapor pressure: Not applicable
- 10) Vapor density (air=1): Not applicable
- 11) Evaporation rate: Not applicable
- 12) Specific gravity (H₂O=1): 0.940 ~ 0.970
- 13) Molecular weight: >10,000

SECTION 10. STABILITY AND REACTIVITY

- 1) Chemical stability: Stable under normal temperature and pressure
- 2) Conditions to avoid: Incompatible materials, strong oxidants
- 3) Incompatibilities with other materials: Strong oxidizing agents
- 4) Hazardous decomposition product: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide

SECTION 11. TOXICOLOGICAL INFORMATION

- 1) LD₅₀: 3200 mg/kg Mouse-in throat
- 2) Inhalation: Product fines may cause mechanical irritation.
- 3) Skin contact: Product is unlikely to cause irritation.
- 4) Eye contact: Product fines can cause mechanical irritation.
- 5) Ingestion: Product is practically non-toxic.

SECTION 12. ECOLOGICAL INFORMATION

- 1) Spill or leak procedures: Shovel and sweep up or use industrial vacuum cleaner. Avoid generation dust clouds. Put into containers for reclaiming or disposal.
- 2) Ecotoxicity: Not applicable

SECTION 13. DISPOSAL CONSIDERATIONS

- 1) Waste disposal method: Place contaminated material in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.
- 2) Environmental hazards: Not applicable

 Honam Petrochemical Corp. Lotte Tower 8/D (9-11F) 395-67, Shindaebang-dong, Dongjak-gu, Seoul, Korea Tel) 82-2-829-4114 Fax) 82-2-843-1010 Homepage) www.hpc.co.kr	Material Safety Data Sheet		File No	MSDS-PE-5000ST
			Issue Date	1996.06.01
	High Density Polyethylene (HDPE)		Revision Date	2005.07.01
			Page	4/4

SECTION 14. TRANSPORTATION REQUIREMENTS

Not applicable

SECTION 15. REGULATORY INFORMATION

1) Korea: Not applicable

2) US Federal

① TSCA: CAS No. 9002-88-4 is listed on the TSCA inventory.

② SARA:

Section 302(RQ): None of the chemicals in this material have an RQ.

Section 304(TPQ): None of the chemicals in this material have an TPQ.

Section 313: No chemicals are reportable under section 313.

③ OSHA: None of the chemicals in this product are considered highly hazardous by OSHA.

SECTION 16. ADDITIONAL INFORMATION

The information contained herein is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Therefore, vendee assumes the risk in his use of the material.

MATERIAL SAFETY DATA SHEET

1. Identification of the substance or mixture and of the supplier

GHS product identifier : HANWHA LLDPE 9730

Recommended use of the chemical and restrictions on use.

- Recommended use: Industrial resin.
- Restrictions on use: Used for recommended use.

Supplier identifier.

- Manufacturers information

- Manufacturers name: Hanwha Chemical Corporation
- Address: 287-9, Pyeongyeo-Dong, Yeosu-si, Jeollanam-do, Korea (Yeosu plant)
- Respondent: PE production 2 Team
 - Tel: +82-61-688-1811, Fax: 061-688-1820

- Supplier information

- Supplier name: Hanwha Chemical Corporation
- Address: Hanwha Building, 1, Janggyo-dong, Jung-gu, Seoul, Korea (PE department)
- Respondent: PE coating sales team
 - Tel: +82-2-729-2990, Fax: +82-2-729-1405

- Emergency phone number: +82-61-688-1802

2. Hazards identification

GHS classification of the substance/mixture:

- Serious Eye Damage/ Irritation: Category 2B

GHS label elements, including precautionary statements.

- Pictogram and symbol: Not applicable
- Signal word: Warning
- Hazard statements:
 - H320: Causes eye irritation.
- Precautionary statements:
 - Precaution:
 - P264: Wash thoroughly after handling.
 - Treatment:
 - P305+P351+P338: IF IN EYES Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do. continue rinsing.
 - P337+P313: If eye irritation persists, Get medical advice/attention.
 - Storage: Not applicable
 - Disposal: Not applicable

NFPA

- health: **1** fire: **1** reactive: **0**

3. Composition/information on ingredients

Chemical Name	Common Name Synonyms	CAS number	Content (%)
LINEAR LOW-DENSITY POLYETHYLENE	LLDPE	9002-88-4	>99.8
Additives	-	-	<0.5

4. First aid measures

Eye contact:

- If you occur symptoms, keep away from exposure.
- Flush eyes with running water for more than 15 minutes.
- Call a POISON CENTER or doctor/physician if you need.

Skin contact:

- Take off contaminated clothing and shoes, wash with soap and water for at least 15 minutes.
- Call a POISON CENTER or doctor/physician if you need.
- Contaminated clothing and shoes, wash and dry thoroughly before reuse.

Inhalation:

- Move victim to fresh air.
- Call a POISON CENTER or doctor/physician if you need.
- Administer oxygen if breathing is difficult.

Ingestion:

- If swallowed, immediately call a POISON CENTER or doctor/physician.
- To prevent airway obstruction while vomiting, maintain the position of the head lower than hips.
- Call a POISON CENTER or doctor/physician if you need.

Acute and delayed symptoms/effects

- Skin and eye contact: May cause slightly irritation.

Indication of immediate medical attention and notes for physician:

- Depending on the response of each patient symptoms and clinical status of the management check.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Firefighting measures

Suitable (and unsuitable) extinguishing media

- Suitable extinguishing media: Dry chemical, CO₂, water, regular foam.
- unsuitable extinguishing media: Do not use straight streams.
- In case of major fire and large quantities: Use dry chemical or water spray.

Specific hazards arising from the chemical

- Thermal decomposition products: Flammable and toxic gas, carbon oxides.
- It could be a slight fire hazard.

Special protective equipment and precautions for fire-fighters

- Move containers from fire area if you can do it without risk.
- Do not scatter spilled material with high pressure water streams.
- Use extinguishing agent suitable for type of surrounding fire.
- Avoid inhalation of material and combustion.
- Stay upwind and Keep out of low areas.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:

- Stop leak if you can do it without risk.
- Wear positive pressure self-contained breathing apparatus(SCBA) in fire.
- If you're contacted with temperature of the substance in the open system, Wear safety glasses with side shield.
- Prevent dust and scattering.
- Refer "Exposure controls/personal protection".

Environmental precautions and protective procedures

- Atmosphere: Conducted in a proper manner ventilation.
- Land: Make an embankment for further processing.
- Underwater: Prevent entry into waterways, sewers.
Collected by means of mechanical and leakage in many cases the Ministry of Environment, Regional Environmental Management Office, City / County Environmental Department reported.

The methods of purification and removal

- Small spill:
 - Dispose of materials by mechanical means.
 - Absorb with non-combustible material.
- Large spill:
 - Make an embankment for further processing.
 - ELIMINATE all ignition sources.

7. Handling and storage

Precautions for safe handling:

- Avoid heat, sparks, flames and other sources of ignition.
- Do not eat, drink or smoke in product area.
- In pneumatic conveying and machine operation, take care the occurrence of dust.
- To reduce the potential for dust explosion suppression, the ground connection caused static electricity.
- Try not to be the accumulation of dust.

Conditions for safe storage:

- Store in a closed container.
- Avoid heat, sparks, flames, strong acid.
- Store in a well ventilated place and in a dry place.
- Protect from direct sunlight to maintain the quality of products.
- Avoid contact with light.

8. Exposure controls/personal protection**Occupational Exposure limits**

- Korean Occupation of Safety and Health Regulation : Not available
- ACGIH: Not available
- OSHA: Not available
- NIOSH: Not available
- Biological exposure index : Not available
- EU Regulation:
 - Bulgaria: OEL-TWAs=10.0mg/m³ (dust)
 - China: OEL- STEL=10 mg/m³ (total dust), TWA=5 mg/m³ (total dust)
 - Czech Republic: OEL-TWAs= 5.0 mg/m³ (dust)
 - Latvia: OEL-TWAs (AERs)= 5 mg/m³
 - Lithuania: OEL-TWAs (IPRVs)=10 mg/m³, MAC=0.1 mg/m³
 - Russia: OEL-MACs=10 mg/m³ (aerosol)
 - Slovak Republic: OEL-TWAs= 5.0 mg/m³ (total solid aerosol)

Appropriate engineering controls:

- If concentration may cause explosion, provide exhaust ventilation system with explosion proof equipment.
- Provide local exhaust ventilation system or other engineering controls.

Personal protective equipment

- Respiratory protection:
 - Wear a NIOSH or European Standard EN 149 approved respirator when necessary.
- Eye/Face protection:
 - Wear appropriate glasses to protect from scattering toxic substance.
 - If you contact with heated material, wear heat durability face shield.
 - Build a shower booth near the place.
- Hand protection:
 - If you contact with heated material, wear heat durability gloves.
- Body protection:
 - If you contact with heated material, wear heat durability protective equipment.

9. Physical and chemical properties

Appearance: Solid (Pellet, White)

Odor: odorless

Odor threshold: Not available

Tatse: Not available

Taste threshold: Not available

pH: Not available

Melting point/freezing point: 110 ~ 130°C

Initial boiling point and boiling range: Not available

Flash point: >231°C

Evaporation rate: Not available

Flammability: Not available

Upper/lower flammability or explosive limits: Not available

Vapor pressure: Small enough to neglected at 25°C

Vapor density: Not applicable

Relative density: Not available

Solubility (ies): Insoluble

Specific gravity: 0.910 ~ 0.930 (Water = 1)

Partition coefficient: n-octanol/water: Not available

Auto ignition temperature: 350°C

Decomposition temperature: Not available

Viscosity: Not applicable

Molecular weight: 1500 - 100,000g/mol

10. Stability and reactivity

Chemical stability: Stable under normal temperatures and pressures.

Possibility of hazardous reactions: No dangerous reaction under conditions of normal use.

Conditions to avoid (e.g., static discharge, shock or vibration):

- May decompose over 350°C (662°F).

Incompatible materials: Nitrate, chlorate, peroxides, strong acid.

Hazardous decomposition products: Methane, Propane, Carbon oxide, Aldehyde, Organic Vapor.

11. Toxicological information

Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);

- Skin and eye contact: May cause slightly irritation.

Symptoms related to the physical, chemical and toxicological characteristics

- Explosives, Water reactive substances, Oxidizing, Self-reactive substances, Organic peroxides: Not applicable (no relevance to molecular structure)
- Refer to "5) Acute and delayed symptoms/effects" of "4.First aid measures"

Symptoms related to the physical, chemical and toxicological characteristics;

- Acute toxicity:
 - oral: Not classified LD₅₀> 2000 mg/kg bw (Rat)
 - dermal: Not available
 - Inhalation(vapour): Not available
- Skin Corrosion/ Irritation: Not classified
 - Tested the acute dermal irritation of polyethylene (average molecular weight of 450) on three New Zealand White rabbits weighing 2.77 to 2.94 kg and 12 to 16 weeks old. Polyethylene caused slight erythema at one treated site at the 24 hour observation. No irritation was observed at the other two treated sites and no corrosive effects were noted during the study. The primary irritation index was calculated as 0.2 and polyethylene was classified as a mild irritant.
- Serious Eye Damage/ Irritation: Category 2B
 - The acute eye irritation potential of polyethylene (average molecular weight of 450) was tested on three New Zealand White rabbits weighing 3.00 to 3.18 kg and ages 12 to 16 weeks old. Redness, chemosis, and discharge of the conjunctivae were scored, with a maximum score of 20. The iris irritation was scored for a maximum score of 10; also, the degree and area of opacity of the cornea were scored, for a maximum score of 80. Polyethylene caused a maximum group mean score of 11.0 and was classified as a mild irritant.
- Respiratory sensitizer: Not available
- Skin Sensitization: Not classified
 - Acute Exposure tested the sensitization potential of polyethylene on 34 female albino Dunkin Hartley guinea pigs (299-364 g, 8-12 weeks old). Polyethylene did not cause skin sensitization in any of the guinea pigs tested.
- Carcinogenicity: Not classified

- IARC: 3
- ACGIH, NTP, OSHA, EC Directive 1272/2008, US EPA: not listed
- Using a mouse or a rat carcinogenicity studies found in the ovarian cancer and uterine sarcoma, but its population is just less carcinogenic in classification is not enough data.
- Mutagenicity: Not classified
 - In vitro* - Ames reversion test(*S. typhimurium*, *Escherichia coli*): Negative
- Reproductive toxicity: Not available
- Specific target organ toxicity (single exposure): Not classified
 - Acute Exposureinvestigated the acute oral toxicity of polyethylene (average molecular weight of 450) in ten male and female Sprague-Dawley CD strain rats (201-223g). During the experimental period, no rats died or had signs of systemic toxicity; they did show an expected gain in bodyweight. Necropsy revealed no abnormalities.
- Specific target organ toxicity (repeat exposure): Not classified
 - Subchronic or Prechronic Exposure/ In a 90-day study, rats and dogs were fed an extract of low molecular weight PE film; Rats fed at a level of 13,500 ppm film extract showed liver changes (fat droplets, cloudy swelling, and increased liver weight) that were considered reversible in all cases. Rats fed at levels of 2700 and 540 ppm and dogs fed 2700 ppm showed no adverse effects.
- Aspiration Hazard: Not available

12. Ecological information

Aquatic Ecotoxicity

- Acute toxicity: Not available
- Chronic toxicity: Not available

- Fish: Not available
- Crustacea: Not available
- Algae: Not available

Persistence degradability:

- Persistence and degradability: Polymers are not degradable, therefore it represents a potential for persistence in the environment.
- Bioaccumulative potential: Polymers are not degradable, a potential for bioaccumulation has to be expected.
- Mobility in soil: Low potency of mobility to soil. (Koc values = 9.42L/kg)

13. Disposal considerations

1) Disposal method:

- Method for disposing waste synthetic polymer compounds
 - Thermosetting waste synthetic resins and other waste synthetic polymer compounds shall be crushed, cut or melted to a size at which the maximum diameter is 15 cm or less and thereafter be disposed in a stable landfill facility.
 - Non-thermosetting waste synthetic resins and other waste synthetic polymer compounds

shall be incinerated.

2) Matters which require attention when disposing waste:

- Standard and method for disposing the designated waste
 - All the generated waste shall be disposed in accordance with the specific standard and method prescribed in the Act so that the environmental pollution may be minimized in the course of collecting, carrying, keep and disposing the waste.
 - The waste shall not flutter or flow out, and a bad smell shall not be diffused.
 - The pollutants shall be disposed below the allowable exhaust standard.
 - Without just reason, the waste shall not be discarded in a place other than the designated places.
 - The waste shall be disposed in the waste disposal facility.

14. Transport information

UN Number: Not applicable

UN Proper shipping name: Not applicable

Transport Hazard class: Not applicable

Packing group: Not applicable

Marine pollutant: Not applicable

Special precautions

- in case of fire: Not applicable
- in case of leakage: Not applicable

15. Regulatory information

Korea:

- Occupational Safety and Health Regulation: Not regulated
- Toxic Chemical Control Act : KE-28877
- Dangerous Material Safety Management Regulation :
 - Synthetic resins is stored more than 3,000kg and handling may be classified as flammable. In this case, 'Item, the maximum quantity, and handling firearms ban' Display the target, the installation height and area, for fire protection facilities between the clearance and may be limited.
- Wastes Control Act : Designated waste (Polyethylene, 01-01-01)

EU classification:

- Classification: Not available
- Risk phrases: Not available
- Safety phrases: Not available
- EU REACH SVHC Free Certified(Candidate list Updated by ECHA on 30th March, 2010)

U.S.A management information

- **OSHA:** Not regulated
- **CERCLA:** Not regulated
- **EPCRA 302:** Not regulated
- **EPCRA 304:** Not regulated

- **EPCRA 313:** Not regulated
- **TSCA Section 8(b) Inventory :** XU
- **FDA - Direct Food Additives:** 21 CFR 172.615 (MW 2000-21000)

Japan management information

- Existing and New Chemical Substances (ENCS): (6)-1; (6)-120; (6)-402

China management information

- Inventory of Existing Chemical Substances (IECSC): Present

Canada management information

- Domestic Substances List (DSL): Present

New zealand management information

- Inventory of Chemicals (NZIoC): May be used as a single component chemical under an appropriate group standard.

Philippines management information

- Inventory of Chemicals and Chemical Substances (PICCS): Present

Substance of Roteradame Protocol: Not regulated

Substance of Stockholme Protocol: Not regulated

Substance of Montreal Protocol: Not regulated

16. Other information

Information source and references:

- ECB:ESIS (European chemical Substances Information System): <http://ecb.jrc.it/esis>
- International Uniform Chemical Information Database (IUCLID): <http://ecb.jrc.it/esis>
- IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT (Multivolume work)., p. S7 216 (1987)
- REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008
- Korea Occupational Health & Safety Agency: <http://www.kosha.net>
- U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB): <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.htm>
- ECOTOX Database, EPA: <http://cfpub.epa.gov/ecotox>
- Waste Control Act enforcement regulation attached [1]
- Korea dangerous material inventory management system (<http://hazmat.nema.go.kr>)
- National chemicals information systems (<http://ncis.nier.go.kr>)

Issuing date: 30 July 1996

Revision number and date

- revision number: 5
- date of the latest revision: 28 May 2010



The information contained herein is to the best of our knowledge and belief accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee for result obtained, and assume no responsibility for damages incurred by use of this product. It is the responsibility of the user to comply with all federal, state and local laws and regulations.