1. Identification of the product and the supplier

1) Chemical Name: PVC COPOLYMER RESIN

2) Advisable use and Restriction
   ○ Advisable use: Plastic Materials
   ○ Restriction of product using: Used for recommended use.

3) Manufacturer/Supplier/Distributor information
   ○ Supplier: LG Chem, LTD. 70-1, Hwachi-dong, Yeosu-si, Jeollanam-do
   ○ Address: Twin Towers, 20, Yeouido-dong, Yeongdeungpo-gu, Seoul
     (LG Chem, LTD PVC/Plasticizer division)
   ○ Emergency response number: +82-61-680-1131
   ○ Respondent: LG Chem, LTD, PVC division, Yeosu PVC plant, QA team

2. Hazard identification

1) Hazard classification:
   ○ Acute toxicity (oral): Category 5
   ○ Germ cell mutagenicity: Category 2
   ○ Carcinogenicity: Category 2
   ○ Aquatic toxicity (acute): Category 3

2) Allocation label elements

<table>
<thead>
<tr>
<th>○ Pictogram and symbol</th>
<th>○ Signal word</th>
<th>○ Hazard statement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>H303: May be harmful if swallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H341: Suspected of causing genetic defects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H351: Suspected of causing cancer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H402: Harmful to aquatic life</td>
</tr>
</tbody>
</table>

○ Precautionary statements
  [Prevention]
  P273: Avoid release to the environment.
  P201: Obtain special instructions before use.
  P202: Do not handle until all safety precautions have been read and understood.
  P281: Use personal protective equipment as required.
3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Common name Synonyms</th>
<th>CAS No.</th>
<th>Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poly Vinyl Chloride (PVC)</td>
<td>Chloroethylene polymer</td>
<td>9002-86-2</td>
<td>90–96</td>
</tr>
<tr>
<td>Vinyl acetate</td>
<td>Acetic acid vinyl ester</td>
<td>108-05-4</td>
<td>3–8</td>
</tr>
<tr>
<td>Volatiles etc.</td>
<td>-</td>
<td>-</td>
<td>&lt; 3</td>
</tr>
</tbody>
</table>

4. First-aid measures

1) Eye contact:
- Keep away from exposure if exposure effect occurred.
- In case of contact with substance, flush eyes with amount of water for at least 15 minutes.
- In case of contact with chemicals, get medical advice/attention.

2) Skin contact:
- Remove contaminated clothing and shoes. Wash skin with soap and water for at least 15 minutes.
- Get medical attention if skin symptoms occurred.
- Wash contaminated clothing and shoes before reuse.

3) Inhalation:
- Move victim to non-contaminated place in fresh air.
- Get medical attention if irritation or symptoms occurred.
- Give artificial respiration if victim is not breathing.
4) Ingestion:
- Get medical attention if swallowed amount of substance.
- Get medical attention if irritation or symptoms occurred.

5) Indication of immediate medical attention and notes for physician:
- Call emergency medical service. Get medical advice/attention, if you needed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-fighting measures

1) Suitable (and unsuitable) extinguishing media:
   ○ Suitable extinguishing media: dry chemical, CO₂, water spray, regular foam
   ○ Unsuitable extinguishing media:
     - Do not use straight streams.
     - Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.

2) Specific hazards arising from the chemical (ex: hazardous combustion products):
- Containers may explode when heated.
- Runoff to sewer may create fire or explosion hazard.

3) Special protective equipment and precautions for fire-fighters:
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters’ protective clothing will only provide limited protection.
- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

6. Accidental release measures

1) Personal precautions, protective equipment and emergency procedures:
- Stop leak if you can do it without risk.
- Isolate exposed area.
- Keep unauthorized personnel away.
- Use certificated protective equipment.
- Ventilate the leaked area.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Use clean non-sparking tools to collect absorbed material.

2) Environmental precautions and protective procedures:
- Ensure adequate ventilation.
- Prevent entry into waterways, sewers or basements.

3) The methods of purification and removal:
- Do not touch or walk through spilled material.
- Prevent entry into waterways, sewers, basements or confined areas.
- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.
7. Handling and storage

1) Precautions for safe handling:
- Wash thoroughly after handling.
- Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures.
- Remove contaminated clothing and wash before reuse.
- Do not get in eyes, on skin, or on clothing.
- Empty containers retain product residue, (liquid and/or vapor), and can be dangerous.
- Avoid contact with heat, sparks and flame.
- Avoid ingestion and inhalation.

2) Conditions for safe storage:
- Store in a closed container.
- Keep away from waterways and sewers.
- Keep away from heat, sparks, and flame.
- Keep away from sources of ignition.
- Store in a cool, dry, well-ventilated area away from incompatible substances.
- Storage for long periods is not recommended.

8. Exposure controls/personal protection

1) Occupational Exposure Limits

<table>
<thead>
<tr>
<th></th>
<th>PVC</th>
<th>Vinyl acetate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korean Occupation of</td>
<td>Not available</td>
<td>TWA - 10ppm , STEL - 15ppm</td>
</tr>
<tr>
<td>Safety and Health Regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACGIH</td>
<td>TWA= 1 mg/m³</td>
<td>TWA - 10ppm , STEL - 15ppm</td>
</tr>
<tr>
<td>OSHA</td>
<td>Not available</td>
<td>TWA - 10ppm , STEL - 20 ppm</td>
</tr>
<tr>
<td>NIOSH</td>
<td>Not available</td>
<td>4 ppm Ceiling (15 min); 15 mg/m³ Ceiling (15 min)</td>
</tr>
<tr>
<td>Biological exposure index</td>
<td>Not available</td>
<td>Not available</td>
</tr>
</tbody>
</table>

**EU Regulation**
- •Ireland – TWA: 10 mg/m³ (total inhalable dust);
  4 mg/m³ (respirable dust)
- •Bulgaria – TWA : 6.0 mg/m³ (dust)
- •Italy - TWA : 1 mg/m³ (respirable fraction)
- •Finland, Greece, Ireland : TWA - 10ppm , STEL - 20 ppm
- •Belgium, Spain, Italy, Portugal : TWA - 10ppm , STEL - 15ppm
- •Denmark, France, Norway - TWA : 30 mg/m³
- •Sweden - TWAs : 18 mg/m³, STEL : 35mg/m³
- •Germany, The Netherlands- TWA : 18 mg/m³

**Other**
- •Austria – STEL: 10 mg/m³
- •Canada - TWA:1mg/m³ (respirable fraction),
  STEL:10mg/m³ (total dust)
- •Japan-TWA: 1 mg/m³ OEL (respirable dust); 4mg/m³ OEL (total dust)
- •Argentina, Canada, China, Taiwan -TWA : 10 ppm, STEL : 15 ppm
- •Australia - TWA - 10ppm , STEL - 20 ppm STEL
2) Appropriate engineering controls
- Provide local exhaust ventilation system or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.
- Check legal suitability of exposure level.

3) Personal protective equipment:
○ Respiratory protection: Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
○ Eye protection:
  - An eye wash unit and safety shower station should be available nearby work place.
  - Wear safety glasses to protect eyes from scattering toxic substance.
○ Hand protection: Wear chemical resistant gloves to avoid direct contact with chemical substance.
○ Body protection: Wear appropriate protective chemical resistant clothing to prevent exposure of skin.

9. Physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Appearance</td>
<td>Solid / white</td>
</tr>
<tr>
<td>2) Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>3) Threshold of odor</td>
<td>Not available</td>
</tr>
<tr>
<td>4) pH</td>
<td>Not available</td>
</tr>
<tr>
<td>5) Melting point/freezing point</td>
<td>Not available</td>
</tr>
<tr>
<td>6) Initial boiling point and boiling range</td>
<td>Not available</td>
</tr>
<tr>
<td>7) Flash point</td>
<td>320~340 °C</td>
</tr>
<tr>
<td>8) Evaporation rate</td>
<td>Not available</td>
</tr>
<tr>
<td>9) Flammability (solid, gas)</td>
<td>Not available</td>
</tr>
<tr>
<td>10) Upper/lower flammability or explosive limits.</td>
<td>Not available</td>
</tr>
<tr>
<td>11) Vapour pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>12) Solubility(ies)</td>
<td>Insoluble</td>
</tr>
<tr>
<td>13) Vapour density</td>
<td>Not available</td>
</tr>
<tr>
<td>14) Specific gravity /Density</td>
<td>1.36~1.38</td>
</tr>
<tr>
<td>15) n-octanol/water partition coefficient</td>
<td>Not available</td>
</tr>
<tr>
<td>16) Auto ignition temperature</td>
<td>435~557 °C</td>
</tr>
<tr>
<td>17) Degradation temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>18) Viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>19) Molecular weight</td>
<td>Not available</td>
</tr>
</tbody>
</table>
10. Stability and reactivity

1) Chemical stability and Possibility of hazardous reactions:
   - Stable under normal temperatures and pressures.

2) Conditions to avoid (e.g., static discharge, shock or vibration):
   - Avoid heat, flames, sparks and other sources of ignition.
   - Avoid contact with incompatible materials.

3) Incompatible materials: Avoid contact with strong acid, heat, flames, sparks and other sources of ignition.

4) Hazardous decomposition products: Carbon monoxide, carbon dioxide

11. Toxicological information

Information of Health Hazardous:

- Acute toxicity:
  - oral: Category 5 (96% of this product consist of an ingredient of unknown toxicity)
    ATEmix = 3,470 mg/kg bw
    - Vinyl acetate : LD50 = 3,470 mg/kg bw (rat)

  - dermal: Not classified (96% of this product consist of an ingredient of unknown toxicity)
    ATEmix = 7,440 mg/kg bw
    - Vinyl acetate : LD50 = 7,440 mg/kg bw (rabbit)

  - Inhalation(dust/mist): Not classified (96% of this product consist of an ingredient of unknown toxicity)
    ATEmix = 15.4 mg/L/4H
    - Vinyl acetate : LC50 = 15.4 mg/L/4H (rat)

- Skin Corrosion/ Irritation: Not classified (96 % of this product consist of an ingredient of unknown toxicity)
  - Vinyl acetate : very slight erythema in two animals at 24 hours which persisted in one animal up to the 48-hour examination.(erythema score : 0.33- fully reversible)

- Serious Eye Damage/Irritation: Not classified (96 % of this product consist of an ingredient of unknown toxicity)
  - Vinyl acetate : fully reversible within: 48 h(conjunctivae score : 0.33)

- Respiratory sensitizer: Not classified (96 % of this product consist of an ingredient of unknown toxicity)
  - Vinyl acetate : No direct information is available from studies in humans on respiratory sensitization. In view of the widespread use, the absence of any reports suggests that vinyl acetate may not be a respiratory sensitizer.

- Skin Sensitization: Not classified (96 % of this product consist of an ingredient of unknown toxicity)
  - Vinyl acetate : No test item-related clinical signs were observed in any animals. On the second application day a slight to moderate ear swelling was observed at both dosing sites in all mice of Group 2 (HCA, 25%) (moderate), Group 4 (10%) (slight, persisting for two days), Group 5(25%) (slight), Group 6 (50%) (moderate) and Group 7 (100%, undiluted) (moderate), persisting for the remaining days. All treated animals survived the scheduled study period.
○ Carcinogenicity: Category 2 (3% of this product consist of an ingredient of unknown toxicity)
  - PVC
    ; IARC: Group 3
    ; NTP, ACGIH, EU Regulation 1272/2008, OSHA: not listed
  - Vinyl acetate :
    ; IARC: Group 2B, ACGIH : A3
    ; NTP, OSHA, EU Regulation 1272/2008, US EPA: Not listed

○ Mutagenicity: Category 2 (3% of this product consist of an ingredient of unknown toxicity)
  - PVC
    ; In vitro – Bacterial reverse mutation test : Negative
  - Vinyl acetate :
    ; In vivo - SCE bone marrow/rat : Positive
    ; In vitro - Sister-chromatid exchange /Human lymphocytes : Positive

○ Reproductive toxicity: Not classified (96% of this product consist of an ingredient of unknown toxicity)
  - Vinyl acetate : F0 generation, no significant differences in mating, fertility, or gestation indices, no effect on gestation length. F1 generation, no effect on mating or gestation indices and length. Therefore, no effect on reproductive toxicity.

○ Specific target organ toxicity (single exposure): Not classified (3% of this product consist of an ingredient of unknown toxicity)
  - PVC : In rats, inhalation of fumes from heated polyvinyl chloride produced interstitial edema, as well as focal bronchial and intra-alveolar hemorrhage in the lungs of some animals. However, it is not enough data to classify the toxicity of this substance.
  - Vinyl acetate : Vinyl acetate vapor at concn below 250 mg/cm³ is a primary irritant to the upper respiratory tract, eyes & the liquid may irritate the skin. The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the lungs, resulting in tissue lesions.

○ Specific target organ toxicity (repeat exposure): Not classified (3% of this product consist of an ingredient of unknown toxicity)
  - PVC : Lungs may be affected by repeated or prolonged exposure to dust particles, resulting in fibrosis. However, This evidence for the classification is not enough.
  - Vinyl acetate : The overall body weight gain was not statistically significantly different (p>0.05) from that of the controls. Urisalnisis results after 12 weeks of treatment, high dose females generally showed a more concentrated and slightly darker coloured urine when compared with the controls. However, This evidence for the classification is not enough.

○ Aspiration Hazard: Not available (100% of this product consist of an ingredient of unknown toxicity)

12. Ecological information

1) Ecological toxicity:
  ○ Acute toxicity: Category 3 (96% of this product consist of an ingredient of unknown toxicity)
  ○ Chronic toxicity: Not classified (96% of this product consist of an ingredient of unknown toxicity)
- Vinyl acetate:
  - Fish: 96hr-LC50(*Oryzias latipes*) = 2.4 mg/l
  - Crustacea: 48hr-EC50(*Daphnia magna*) = 12.6 mg/l (OECD TG 202)
  - Algae: 96hr-EC50(*Pseudokirchneriella subcapitata*) = 12.7 mg/l (OECD TG 201)

2) Persistence and degradability
   - Vinyl acetate: Low persistency (log Kow is less than 4 estimated. (log Kow=0.73(exp))

3) Bioaccumulative potential
   ○ Bioaccumulation:
     - Vinyl acetate: Bioaccumulation is expected to be low according to the value of logKow<4 (log Kow=0.73)
       and BCF<500(BCF=3.2)
   ○ Biodegradation:
     - Vinyl acetate: In biodegradation test, 90% biodegradation was observed after 14 days.

4) Mobility in soil:
   - Vinyl acetate: Low potency of mobility to soil. (Koc values = 60 (estimated) L/kg)

13. Disposal considerations

1) Disposal method:
   - Waste must be disposed of in accordance with federal, state and local environmental control regulations.

2) Disposal precaution:
   - Consider the require attentions in accordance with waste treatment management regulation.

14. Transport information

1) UN Number: Not applicable

2) UN Proper shipping name: Not applicable

3) Transport Hazard class: Not applicable

4) Packing group: Not applicable

5) Marine pollutant: Not applicable

6) Special precautions
   ○ in case of fire: Not applicable
   ○ in case of spill: Not applicable
## 15. Regulatory information

### PVC

**Korea:**
- Occupational Safety and Health Regulation: Not regulated
- Toxic Chemical Control Act: Not regulated
- Dangerous Material Safety Management Regulation: Not regulated
- Wastes Control Act: Not regulated

**EU classification:**
- Classification: Not available
- Risk phrases: Not available
- Safety phrases: Not available

**U.S.A management information:**
- CERCLA 103 (40CFR302.4): Not regulated
- EPCRA 302 (40CFR355.3): Not regulated
- EPCRA 304 (40CFR355.4): Not regulated
- EPCRA 313 (40CFR372.65): Not regulated
- United States - Section 8(b) Inventory (TSCA): XU

**Japan management information:**
- Inventory-Existing and New Chemical Substances (ENCS) = (6)-66; (6)-67; (6)-76; (6)-1633

**China management information:**
- Inventory of Existing Chemical Substances (IECSC) = Present

**Canada management information:**
- Domestic Substances List (DSL) = Present

**Philippines management information:**
- Inventory of Chemicals and Chemical Substances (PICCS) = Present

**Australia management information:**
- Inventory of Chemical Substances (AICS) = Present

**Substance of Rotterdam Protocol:** Not regulated

**Substance of Stockholm Protocol:** Not regulated

**Substance of Montreal Protocol:** Not regulated
<table>
<thead>
<tr>
<th>Country</th>
<th>Management Information</th>
</tr>
</thead>
</table>
| Korea   | - Occupational Safety and Health Regulation: Occupational exposure limits listed, work environment monitoring listed, Administration subject listed  
- Toxic Chemical Control Act: Korean Existing Chemicals (KE-35324)  
- Dangerous Material Safety Management Regulation: Petroleum, class 4-1, (Insoluble liquid), 200L  
- Wastes Control Act: Not regulated |
| EU      | - Classification: F; R11  
- Risk phrases: R11  
- Safety phrases: S2, S16, S23, S29, S33 |
- CERCLA 103 (40CFR302.4): 5000 lb final RQ; 2270 kg final RQ  
- EPCRA 302 (40CFR355.3): 5000 lb EPCRA RQ  
- EPCRA 304 (40CFR355.4): Not regulated  
- EPCRA 313 (40CFR372.65): Not regulated  
- United States - Section 8(b) Inventory (TSCA): Acetic acid ethenyl ester, Acetic acid ethenyl ester, Acetic acid ethenyl ester, Acetic acid ethenyl ester, Acetic acid ethenyl ester, Present |
| Japan   | - Inventory-Existing and New Chemical Substances (ENCS) = (2)-728 |
| China   | - Inventory of Existing Chemical Substances (IECSC) = Present |
| Canada  | - Domestic Substances List (DSL) = Present |
| Philippines | - Inventory of Chemicals and Chemical Substances (PICCS) = Present |
| Australia | - Inventory of Chemical Substances (AICS) = Present |
| Roterdame | Substance of Roterdame Protocol: Not regulated |
| Stockholm | Substance of Stockholme Protocol: Not regulated |
| Montreal | Substance of Montreal Protocol: Not regulated |
16. Other information

1) Information source and references:
   - U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB)
   - U.S. National library of Medicine (NLM) Chemical Carcinogenesis Research Information System (CCRIS)
     World Health Organization, International Agency for Research on Cancer, 1972-PRESENT (Multivolume work),
     p. S7 216 (1987)
   - AKRON: http://ull.chemistry.uakron.edu/erdl
   - ACGIH, TLV and BELs # 0108, 2008
   - IPCS INCHEM: http://www.inchem.org/documents/icsc/icsc/eics1487.htm
   - National chemicals information systems :http://ncis.nier.go.kr
   - U.S. National library of Medicine (NLM) Genetic Toxicology Data Bank (GENETOX)
   - EU RAR: http://ecb.jrc.ec.europa.eu/esis/
   - IUCLID Chemical Data Sheets : http://ecb.jrc.ec.europa.eu/esis/
   - ECOTOX: http://cfpub.epa.gov/ecotox/
   - ICSC: http://www.inchem.org/
   - U.S. National library of Medicine (NLM) ChemIDplus Lite
   - Waste Control Act enforcement regulation attached [1]
   - UN RTDG:United Nations Recommendations on the Transport of Dangerous Goods
   - EPISUITE v4.0:http://www.epa.gov/opt/exposure/pubs/episuiteld.htm
   - Data provided by LG Chem CO., Ltd.

2) Issue date : 2000. 06. 28

3) Revision number and date : 2011. 05. 13 (2th)

4) Other material safety data sheet information:
   Since the user's working conditions are not known by us, the information supplied on this safety data sheet is
   based on our current level of knowledge and on national and community regulations. The product must not be
   used for any purposes other than those specified under heading 1 without first obtaining written handling
   instructions. It is at all times the responsibility of the user to take all necessary measures to comply with legal
   requirements and local regulations. The information given on this safety data sheet must be regarded as a
   description of the safety requirements relating to our product and not a guarantee of its properties.
### Record management

<table>
<thead>
<tr>
<th>Revision</th>
<th>Revision categories</th>
<th>Revision content</th>
<th>Revision date</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Part</td>
<td>3, 4-①, 5-①, 6-①, 8-①</td>
<td>2005.03.01</td>
<td>Kim Jong-Tae</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>Part</td>
<td>Change of form, Revision by recent Data</td>
<td>2011.5.10</td>
<td>Kim Jong-Tae</td>
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