# Material Safety Data Sheet

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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| 1) Product name | YD-E Hardener |
| 2) Chemical description | Composition. Ink for screen printing |
| 3) Company identification | SAMSUNG CHEMICAL.CO., LTD.<br>63, 7BEON-GIL, HWANGGEUM 3-RO, YANGCHON-EUP, GIMPO-Si, GYEONGGI-DO, KOREA |
| 4) Telephone +82-31-944-4494 | Fax +82-31-987-3362 |
| 6) Approval date : 2018-09-19 | |

## 2. HAZARD IDENTIFICATION

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|---|---|
| 1) Appearance | clear |
| 2) Odor | soft odor |
| 3) Symbol(s) |  |
| 4) Signal Word | Warning |
| 5) Hazard statement | Flammable liquid and vapor.<br>May be harmful if swallowed.<br>May be harmful in contact with skin.<br>Causes eye irritation. |
| 6) Other Hazards | None identified. |
| 7) Precaution(s) | Avoid breathing dust / fume / gas / mist / spray. Keep away from heat / sparks / open flames / hot surfaces. – No smoking. Wear protective gloves / eye protection / face protection. Use explosion-proof electrical / ventilating / lighting / equipment. |
| 8) Response | In case of fire : Use CO2, dry chemical or foam for extinction. Water can be used to cool and protect exposed material.<br>IF ON SKIN : Rinse skin with water. Call a POISON CENTER or doctor if you feel unwell. Remove immediately all contaminated clothing.<br>IF IN EYES : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.<br>IF SWALLOWED : Call a poison center or doctor if exposed or you feel unwell. |
| 9) Storage Procedures | Store in a well-ventilated place. Keep cool. |
| 10) Disposal | All disposal practices must be in accordance with local, national and International regulations. |

**3. Composition/Information on Ingredients**

| Chemical Name | CAS NO. | Percentage (by wt) |
|---|---|---|
| KOCOSOL #150 | 64742-94-5 | 1 ~ 10 |
| Butyl Cellosolve | 111-76-2 | 10 ~ 20 |
| Polyamide | — | 60 ~ 70 |
| | | |
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**4. First Aid Measures**

1) Eyes — Immediately flush eyes with plenty of water for at least 15 minutes or until chemical is removed. Remove contact lenses, if present and easy to do. Immediately call a poison center or doctor.

2) Skin — Immediately remove all contaminated clothing. Rinse skin with water / shower. Call a poison center or doctor if you feel unwell. Launder contaminated clothing before reuse and discard leather articles saturated with the material.

3) Inhalation — Remove victim to fresh air and keep at rest in a position comfortable for breathing. If breathing is labored, administer oxygen. If breathing has stopped, apply artificial respiration. Call a poison center or doctor.

4) Ingestion — DO NOT INDUCE VOMITING. Get immediate medical attention. Call a poison center or doctor if exposed or you feel unwell.

5) Advice for the protection of first-aid providers — When providing first aid always protect yourself against exposure to chemicals or blood borne diseases by wearing gloves, masks and eye protection. If providing CPR use mouthpieces, resuscitation bags, pocket masks or other ventilation devices. After providing first aid wash your exposed skin with soap and water.

6) Additional Information — Note to physician: Treat symptomatically.

**5. Fire Fighting Measures**

1) Flash Point (℃) — 45 ~ 46

2) Fire Point (℃) — 354

3) Explosion Limit, upper (vol %) — no data

4) Explosion limits, lower (vol %) — no data

5) Extinguishing Media — CO2, dry chemical, foam, water spray, water fog. Do not use water.

6) Unsuitable Extinguishing Media — Not determined.

7) Firefighting Procedures — Wear full protective fire gear including self-containing breathing apparatus operated in the positive pressure mode with full face piece, coat, pants, gloves and boots. Water may cause splattering. Use water to cool

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| | containers exposed to fire. Dilution of burning liquid with water will reduce intensity of flame. If possible, immediately isolate material from fire. Cool fire exposed containers with water after the fire is extinguished. For massive fire in a storage area, use an unmanned hose holder. Fogging is recommended. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the auto ignition temperatures possibly resulting in spontaneous combustion. Do not release chemically contaminated water into drains, soil or surface water. |
| 8) Unusual Fire & Explosion Hazards | Vigorous or explosive reaction may occur on heating or burning. Toxic fumes, gases or vapors may evolve on burning. Vapors may be heavier than air and may travel along the ground to a distant ignition source and flash back. Container may rupture on heating. Keep material away from from heat, sparks, pilot lights, static electricity and open flame. Vapors may form explosive mixtures with air. Spills of this material onto hot fibrous insulation may lower its auto ignition temperature and result in spontaneous combustion. Do not use compressed air to transfer this material. May explode when heated. Forms explosive mixtures in air. Prevent static discharge. DO NOT USE a solid stream of water. Flammable hydrogen gas may be produced on contact with aluminum, tin, lead and zinc. See section 10 for additional information. |
| **6. Fire Fighting Measures** | |
| 1) Personal precaution, protective equipment and emergency procedures | May form explosive mixtures with air. Immediately evacuate all personnel from danger area. Only trained personnel should be permitted in area. Personal protective equipment must be worn. Avoid contact with skin, eyes or clothing. Ventilate area if spilled in a confined space or other poorly ventilated area. Eliminate all sources of heat, sparks, pilot lights, static electricity and open flames. |
| 2) Environmental precaution and protective procedures. | Do not flush into surface water, sanitary sewer or ground water system |
| 3) Methods for clean-up and removal | Use non-sparking tools. Pick up free liquid for recycle and/or disposal if can be accomplished safely with explosion proof equipment. Residual liquid can be absorbed on inert material. Small spills: contain spilled material. Transfer to secure containers. Where necessary collect using absorbent media. Larger spills: stop spill and dike area to prevent spreading, pump liquid to salvage tank. remaining liquid may be taken up on sand, clay, earth, floor absorbent or other absorbent material and shoveled into containers. |

**7. Accidental Release Measures**

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| 1) Personal precaution, protective equipment and emergency procedures | May form explosive mixtures with air. Immediately evacuate all personnel from danger area. Only trained personnel should be permitted in area. Personal protective equipment must be worn. Avoid contact with skin, eyes or clothing. Ventilate area if spilled in a confined space or other poorly ventilated area. Eliminate all sources of heat, sparks, pilot lights, static electricity and open flames. |
| 2) Environmental precaution and protective procedures. | Do not flush into surface water, sanitary sewer or ground water system. |
| 3) Methods for clean-up and removal | Use non-sparking tools. Pick up free liquid for recycle and/or disposal if can be accomplished safely with explosion proof equipment. Residual liquid can be absorbed on inert material. Small spills: contain spilled material. Transfer to secure containers. Where necessary collect using absorbent media. Larger spills: stop spill and dike area to prevent spreading, pump liquid to salvage tank. remaining liquid may be taken up on sand, clay, earth, floor absorbent or other absorbent material and shoveled into containers. |

**8. Handling and Storage**

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| 1) Pumping Temperature | Not determined. |
| 2) Maximum Handling Temperature | Ambient |
| 3) Handling Procedures | Keep away from ignition sources such as heat, sparks and open flame. No smoking. Open container in a well ventilated area. Avoid breathing vapors. Keep containers closed when not in use. Do not discharge into drains or the environment, dispose to an authorized waste collection point. Use appropriate containment to avoid environmental contamination. Avoid drinking, tasting, swallowing or ingesting this product. Avoid breathing vapor. Avoid contact with eyes, skin and clothing. Avoid breathing dust, fume, gas, mist, vapors or spray. Distillation residues should be handled with caution until shown to be peroxide-free. Ground / bond container and receiving equipment. Use grounding and bonding connection when transferring material to prevent static discharge, fire and explosion. Use spark-resistant tools. Minimize exposure to air. If peroxide formation is suspected, do not open or move container. Do not distill to near dryness. Use explosion-proof equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Empty containers retain material residue. Do not cut, weld, braze, solder, drill, grind or expose containers to heat, flame, spark or other sources of ignition. Dispose of packaging or containers in accordance with local, regional, national and international regulations |
| 4) Maximum Storage Temperature | Ambient |
| 5) Storage Procedures | Isolated outside storage is preferred. Inside storage area should be in a |

flammable liquids cabinet or storage area. Store in dry area, 0 - 100 deg F (-18 - 38 deg C). Store material in stainless steel or mild steel tanks. Do not store in aluminum, copper or copper alloys or galvanized steel. Possible peroxide former. Do not allow to evaporate to near dryness. Periodically test product stored for long periods for peroxide formation. Addition of water or appropriate reducing materials will lessen peroxide formation. Keep container tightly closed. Do not store in plastic. Do not store in open, unlabeled or mislabeled containers. Store in accordance with local, regional, national and international regulations. See section 10 for incompatible materials.

6) Maximum Loading Temperature Ambient

**9. Exposure Controls/Personal Protection**

1) Exposure Limits

| Chemical Name | NIOSH | | OSHA | | ACGIH | |
|---|---|---|---|---|---|---|
| | TWA | STEL | TWA | STEL | TWA | STEL |
| KOCOSOL #150 | - | - | - | - | - | - |
| Butyl Cellosolve | 20ppm 97 ㎎/㎥ | - | - | - | 20ppm | - |
| Polyamide | - | - | - | - | - | - |
| | - | - | - | - | - | - |
| | - | - | - | - | - | - |
| | - | - | - | - | - | - |

2) Other Exposure Limits None known.

3) Engineering Controls Material should be handled in enclosed vessels and equipment, in which case general (mechanical) room ventilation should be sufficient. Local exhaust ventilation should be used at points where dust, mist, vapors or gases can escape into the room air. Additional ventilation or exhaust may be required to maintain air concentrations below recommended exposure limits. Use explosion proof equipment.

4) Personal Protective Equipment

Respiratory Protection Use full face respirator with a combination organic vapor and high efficiency filter cartridge if the recommended exposure limit is exceeded. Use self contained breathing apparatus for entry into confined space, for other poorly ventilated areas and for large spill clean-up sites.

Eye Protection Safety glasses. If potential for splash or mist exists, wear chemical goggles or face shield.

Gloves Procedures Natural Rubber. Polyvinyl chloride. Butyl rubber. Nitrile. Neoprene. Gloves should always be inspected before each use and discarded if they show tears, pinholes, or signs of wear.

Clothing Recommendation Long sleeve shirt is recommended. Wear a chemically protective apron when contact with material may occur. Use nitrile rubber boots when necessary to avoid contaminating shoes. Launder contaminated clothing before reuse.

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| Hygiene Measures | Wash thoroughly after handling th |

**10. Physical and Chemical Properties**

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| 1) Physical state / Appearance | clear |
| 2) Odor | soft odor |
| 3) Boiling point/range(℃) | 170 ~ 210 |
| 4) Melting point/range(℃) | no data |
| 5) Specific gravity | 0.9 ~ 1.10 |
| 6) Vapor pressure (20℃) | no data |
| 7) Vapor density | no data |
| 8) Solubility (in water) | insoluble |
| 9) pH | Not applicable |

**11. Stability and Reactivity**

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| 1) Stability | Material is normally stable at moderately elevated temperatures and pressures. |
| 2) Decomposition Temperature | Not determined. |
| 3) Incompatibility | Strong acids. Alkalis. Strong oxidizing agents. Halogens and halogenated compounds. Aluminum |
| 4) Polymerization | Will not occur. |
| 5) Thermal Decomposition | Smoke, carbon monoxide, carbon dioxide, aldehydes and other products of incomplete combustion. Under combustion conditions, oxides of the following elements will be formed: phosphorus. |
| 6) Conditions to Avoid | Do not expose to excessive heat, ignition sources, or oxidizing materials. Elevated temperatures. Exposure to air. Contact with strong oxidizers. Acids. |

**12. Toxicological Information**

| Chemical Name | Oral LD50 | Skin LD50 | Inhalation LD50 |
|---|---|---|---|
| KOCOSOL #150 | 5000mg/kg | 2000mg/kg | 0.59mg/l |
| Butyl Cellosolve | 1746mg/kg | 99mg/kg | 2.2mg/l |
| Polyamide | — | — | — |
| | | | |
| | - | - | - |
| | - | - | - |

2) No experimental data of the product available.

3) Respiratory exposure to the solvents lead to coughing, headache, dizziness, sickness, vomiting and drowiness.

4) Long term exposure may lead to effects of the nervous system.

5) Frequent or continuous skin contact causes irritation and may lead to dermatitis.

**13. Ecological Information**

No experimental data of the product available.

**14. Disposal Considerations**

1) Dispose of in a manner consistent with federal, state, and local regulations.

2) Controlled incineration is recommended.

3) Contaminated containers can be reused after cleaning.

**15. Transport Information**

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|---|---|
| 1) UN NO. | 1263 |
| 2) UN CLASS | 3 |
| 3) PACKING GROUP | Ⅲ |
| 4)IMDG EMS Fire | F-E |
| 5)IMDG EMS Spill | S-D |

**16. Regulatory Information**

1) Registered in

| Chemical Name | EINECS | TSCA | AICS | DSL |
|---|---|---|---|---|
| KOCOSOL #150 | - | - | - | - |
| Butyl Cellosolve | - | - | - | - |
| Polyamide | - | - | - | - |
| | | | | |
| | | | | |

2) Keep container in a well-ventilated place. Keep away from sources of ignition. No smoking. Do not empty into drains. Take precautionary measures against static discharges.

**17. OTHER INFORMATION**

This information only concerns the above mentioned product and does not need to be valid if use with other product(s) or in any process. The information is to our best knowledge correct and complete and is given in good faith but without warranty. It remains the use's own responsibility to make sure that the information is appropriate and complete for his special use of this product.