1. IDENTIFICATION

1. Product Name

1) Product Name : POTASSIUM HYDROXIDE – FLAKE

2) Other Name : CAUSTIC POTASH, DRY SOLID, FLAKE, KOH

2. Recommended Use and Restriction on Use

1) General use : Additive of food production, Organic Synthesis material

2) Restriction on Use : Not available

3. Manufacturer/Distributor Information :

Manufacturer	Address	Emergency Phone No. :	Division in charge
UNID Co., Ltd. Incheon Plant	587-84, Hakik-Dong. Nam-Ku, Inchon. Korea.	(TEL)+81-32-830-7777 (FAX)+81-32-832-4491	Environmental Safety Team

Home Page : www.unid.co.kr

2. HAZARD IDENTIFICATION

1. GHS Classification

Physical Hazards	Health Hazards	Environmental Hazards
Corrosive to metals Cat. 1	Acute toxicity Cat. 4(Oral) Skin corrosion/irritation Cat. 1	-

2. GHS label elements, including precautionary statements

1) Hazard symbols

2) Signal word : Danger

3) Hazard statement

-. H290 May be corrosive to metals
-. H302 Harmful if swallowed
-. H314 Causes severe skin burns and eye damage

4) Precautionary statement

Prevention	-. P234 Keep only in original container. -. P264 Wash hands thoroughly after handling. -. P270 Do not eat, drink or smoke when using this product. -. P260 Do not breathe dust/fume/gas/mist/vapours/spray. -. P280 Wear protective gloves/protective clothing/eye protection/face protection.
Response	-. P390 Absorb spillage to prevent material damage. -. P301+P312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. -. P330 Rinse mouth. -. P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. -. P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. -. P363 Wash contaminated clothing before reuse. -. P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. -. P310 Immediately call a POISON CENTER or doctor/physician. -. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Storage	-. P406 Store in corrosive resistant/container with a resistant inner liner. -. P405 Store locked up.
Disposal	-. P501 Dispose of contents/container in accordance with local/regional/national/international regulation.

3. Other hazards which do not result in classification :

-. Skin exposure may cause serious damage.

-. Exposure to dust or mist may cause nasal septum disorder.

-. Eye contact may cause conjunctival edema and corneal destruction.

-. Inhalation may cause severe pain in the upper respiratory tract.

-. Ingestion may cause vomiting, diarrhea and burning pain in the throat and mouse.

-. Severe exposure may cause pneumonia, circulatory failure and peritonitis.

-. NFPA Grade (0~4 level) : Health-3, Flammability-0, Reactivity-1

3. COMPOSION/INFORMATION ON INGREDIENTS

Chemical Name	Other name	CAS Number	Contents(%)
POTASSIUM HYDROXIDE	-	1310-58-3	90% / 95%
WATER	-	7732-18-5	5~10%

Chemical Name	CAS NO	KE NO	UN NO	EN NO
POTASSIUM HYDROXIDE	1310-58-3	KE-29139	1813	215-181-3

4. FIRST-AID MEASURES

1. Eye Contact :
   - -. Immediately hold eyelids apart and flush the eye continuously with running water for at least 15 minutes.
   - -. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.
   - -. Transport to hospital or doctor without delay.
   - -. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

2. Skin Contact :
   - -. Immediately flush the affected area with large amounts of water for at least 15 minutes.
   - -. Remove contaminated clothing and shoes immediately.
   - -. Transport to hospital, or doctor.

3. Inhalation :
   - -. Remove exposed person to fresh air.
   - -. If not breathing, give artificial respiration.
   - -. If breathing is difficult, give oxygen.
   - -. Get medical attention immediately.

4. Ingestion :
   - -. Wash out mouse with water.
   - -. If swallowed do NOT induce vomiting.
   - -. Never give anything by mouth to an unconscious person.
   - -. Give large amounts of water or 2~4 cups of milk if conscious.
   - -. Lay the patient down as head would be lower than body for suffocation prevention if occur vomiting.
   - -. Get medical attention immediately.

5. Delayed and immediate effects and also chronic effects from short and long term exposure :
   - -. If inhalation may cause nose and throat pain.
   - -. May cause severe Eye, skin and respiratory irritation or burns.
   - -. If ingestion may cause nausea, vomiting and stomach burns.

6. First-aid treatment and note to physician :

-. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
-.Do not try to gastric lavage or induce vomiting.
-.Treatment may vary with condition of victim and specifics of incident.

5. FIRE-FIGHTING MEASURES

1. Suitable (Unsuitable) extinguishing media :
   -. Extinguishing media : foam, Water, Dry chemical powder, CO2
   -. If large fire, use regular extinguishing media or flood with fine water spray.
   -. Unsuitable extinguishing media : Do not use water-jet.

2. Specific hazards arising from the chemical :
   -. Hazardous combustion product :
   Thermal decomposition may produce toxic or/and corrosive fume of potassium oxide.
   Carbon monoxide when reacting with carbohydrates, and hydrogen gas when reacting with aluminum, zinc and tin.
   Thermal oxidation can produce toxic fumes of potassium oxide (K20).
   -. Fire & Explosion hazard: May be ignored.
   -. Contact with water or moisture may generate enough heat to ignite combustibles.
   -. Can react with chemically reactive metals such as aluminum, zinc, magnesium, copper, etc. to release hydrogen gas which can form explosive mixtures with air.

3. Special protection actions and equipments for fire-fighting :
   -. Firefighters should wear self contained breathing apparatus and protective clothing.
   -. If safe to do so, remove containers from path of fire.
   -. If removal is impossible, cool containers and surrounding area with water.
   -. Cool containers with flooding quantities of water until well after fire is out.
   -. Wear full body protective clothing with breathing apparatus.
   -. Do not allow run-off from fire fighting to enter drains or water courses.
   -. Do not approach the edges of the tank.
   -. Avoid inhalation of vapor and keep upwind.

6. ACCIDENTAL RELEASE MEASURES

1. Personal precautions
   -. Wear appropriate personal protective equipment and avoid inhalation or contact with eyes

and skin.
-. Wear appropriate personal protective equipment(see section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION).
-. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
-. Do not touch or walk through spilled material.
-. Isolate the site as a leak area by providing a zone that has an appropriate width to all directions.
-. Stop leak if you can do it without risk.
-. Keep unnecessary people away.
-. Isolate hazard area and deny entry.
-. Ventilate leak areas.

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

3. Methods and materials for containment and cleaning up
1) Small spills
-. Clean up all spills immediately.
-. Avoid generating dust.
-. For disposal of spilled material in appropriate containers collected and clear surface.
2) Large spills
-. Contain spill with sand, earth or vermiculite.
-. Collect recoverable product into labelled containers for recycling.
-. Neutralise/decontaminate residue.
-. Wash spill area with water
-. Prevent runoff into waterways, sewers, basements or confined spaces.

7. HANDLING AND STORAGE

1. Handling
-. Avoid breathing dust and contact with the eyes, skin.
-. Wear appropriate personal protective equipment(see section 8. EXPOSURE CONTROLS /PERSONAL PROTECTION).
-. Use in a well-ventilated area.
-. WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
-. Avoid contact with heat, open flames, sparks and other source of ignition
-. Avoid contact with incompatible materials.
-. When handling, DO NOT eat, drink or smoke.
-. Keep containers securely sealed when not in use.
-. Wash hands with soap and water after handling.
-. Work clothes should be laundered separately. Launder contaminated clothing before re-use.

2. Storage Precautionary Statements

-. Store in original containers.
-. Keep containers securely sealed.
-. Store in a cool, dry, well-ventilated area.
-. Store away from incompatible materials and foodstuff containers.
-. Avoid contact with heat, open flames, sparks and other source of ignition
-. Store away from water or moisture and store in dry area(strong hygroscopic property).
-. Keep this product away from VOCs (Volatile Organic Compounds) to prevent its discoloration.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

1. Exposure Limits

-. Exposure limit under ISHL(KOREA) : TWA (C2 ㎎/㎥), STEL (-)

-. ACGHIH limit : TLV 2 mg/m3 Ceiling

-. Biological exposure limits : Not applicable

2. Engineering Controls

-. The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.

3. Personal Protective Equipment

1) Respiratory Protection :

-. 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

2) 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.

3) Hand protection : Wear appropriate protective gloves.

4) Body protection : Wear appropriate protective cloth.

9. PHYSICAL AND CHEMICAL PROPERTIES

1. Appearance : Solid / No color or White
2. Odor : No odor
3. Odor threshold : Not available
4. pH : 12.0 (0.1 M Solution)
5. Melting point / Freezing point : 380℃
6. Initial Boiling Point / Boiling Ranges : 1320℃(@ 101 KPa)
7. Flash point : Not available (Nonflammable)
8. Evaporation Rate : Not available
9. Flammability (solid, gas) : Not applicable
10. Upper/Lower Flammability or explosive limits : Not available (Nonflammable)
11. Vapor pressure : 1 ㎜Hg at 719℃
12. Solubility : 112g/100 ㎖ at 20℃ (water), Soluble : Ethanole
13. Vapor density : Not available (Not applicable)
14. Relative density : 2.04 (water=1)
15. Partition coefficient of n-octanol/water : Not available
16. Autoignition Temp. : Not available (Not applicable)
17. Decomposition Temp. : Not available
18. Viscosity : Not available
19. Molecular weight : 56.11

10. STABILITY AND REACTIVITY

1. Stability

-. This material is stable under recommended storage at normal temperature and pressure.

-. When dissolved in the water, may produce dilution heat.

2. Possibility of Hazardous Reaction

-. Polymerization : Will not occur.

3. Conditions to Avoid

-. Keep away from heat, flame, sparks and source of ignition.

-. Hazadous vapors may accumulate in confined spaces.

-. Contact with combustible materials may ignite or explode.

4. Materials to Avoid

-. Acid, Combustible materials, Metals, halocarbon compounds, oxidizer, metal salt, reductant, reducing agent materials

5. Hazardous Decomposition Products :

-. Thermal decomposition may produce toxic or/and corrosive fume of potassium oxide.

-. Carbon monoxide when reacting with carbohydrates, and hydrogen gas when reacting with aluminum, zinc and tin.

-. Thermal oxidation can produce toxic fumes of potassium oxide (K20).

11. TOXICOLOGICAL INFORMATION

1. Information of Exposure route :

1) (Respiratory tract) : May cause respiratory irritation.

2) (Oral) : Harmful if swallowed

3) (Eye ·Skin) : Causes severe skin burns and eye damage

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

1) Acute Toxicity :

-. Oral Toxicity : LD50 = 333mg/kg b.w.(Rat ; Sprague-Dawley.)

-. Dermal Toxicity : Not available

-. Inhalation Toxicity : Not available

2) Skin corrosion/irritation :

-. Application of KOH 10% during the 4hours in a rabbit Draize test, KOH was appeared as corrovie.

3) Serious eye damage/irritation :

-. Reporeted as cause irreversible damage in human and in a rabbit Draize test.

4) Respiratory sensitization : Not available

5) Skin sensitization :

-. In the intracutaneus skin sensitisation test with guinea pig, allergic skin reactions wasnot observed.

6) Carcinogenicity : Not applicable

7) Germ cell mutagenicity :

-. KOH was not mutagen because negative results were obtained in bacterial reverse mutation assay and in a mouse bone micronucleus test.

8) Reproductive toxicity :

-. No adverse effects were observed in the reproductive sturdy using mouse or rat.

9) Specific Target organ Toxicity(single exposure) :

-. Inhalation of dust or mist may cause injury in nose and respiratory.

10) Specific Target organ Toxicity(repeated exposure) : Not available

11) Aspiration hazard : Not availables

12. ECOLOGICAL INFORMATION

1. Ecotoxicity :

-. Toxicity to fish : LC50=80mg/L, 96hr, Gambusia affinis(non-GLP)

-. Toxicity to daphnia magna : EC50=660mg/L, 48hr, Daphnia magna(non-GLP)

-. Toxicity to algal : EC50=1337mg/L, 120hr, Nitscheria linearis(non-GLP)

2. Persistence and degradability :

-. Persistence : log Kow -3.88

3. Bioaccumulation :

-. Bioaccumulation : BCF 3.162

-. Biodegration : Ready biodegration(BiOWin 5)

4. Mobility in soil : Not available

5. Other adverse effects : Not available

13. DISPOSAL CONSIDERATIONS

1. 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.

2. 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 INDORMATION

1. UN Number : UN 1813
2. UN Proper Shipping name : POTASSIUM HYDROXIDE, SOLID
3. Transport hazard class(es) : 8
4. Packing group : 2
5. Sea pollutants : Not applicable
6. Special precautions for user related to transport or transportation measures :

-. EmS FIRE SCHEDULE : F-A

-. EmS SPILLAGE SCHEDULE : S-B

15. REGULATORY INFORMATION

1. ISHL(The industrial Safety and Health Law in Korea)

; Environment monitoring required substances

Korea occupational exposure limits

Hazardous Substances Requiring Management

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

; Toxic Chemical [POTASSIUM HYDROXIDE and its compounds: Contents > 5 %]

3. Dangerous goods Safety Management Law in Korea : Not applicable
4. Waste Management Law in Korea : Designated waste
5. Other regulations

1) POPs Management Law : Not applicable

2) Information of EU Classification :

-. Classification :

Xn (Harmful) : R22

C (Corrosive) : R35

-. Symbol(s) and Indication(s) of Danger :

R22 : Harmful if swallowed.

R35 : Causes severe burns.

-. Risk and Safety Phrases :

S1/2 : Keep locked up and out of reach of children.

S26 : In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36/37/39 : Wear suitable protective clothing, gloves and eye/face protection.

S45 : In case of accident or if you feel unwell, seek medical advice immediately. (show the lable where possible).

3) US REGULATIONS :

-. CERCLA section 103 (40 CFR 302.4) : POTASSIUM HYDROXIDE 1000 LBS RQ

-. SARA section 302 (40 CFR 355.30) : Not regulated

-. SARA section 304 (40 CFR 355.40) : Not regulated

-. SARA Hazard Categories, SARA section 311/312 (40 CFR 370.21)

ACUTE: YES

CHRONIC: NO

FIRE: NO

REACTIVE : YES

SUDDEN RELEASE : NO

-. SARA section 313 (40 CFR 372.65) : Not regulated

-. OSHA regulation (29 CFR 1910.119) : Not regulated

-. US STATE REGULATIONS :

CALIFORNIA PROPOSITION 65 (Safe Drinking Water and Toxic Enforcement Act) : Not regulated

4) Chemical inventory status:

-. US inventory (TSCA): listed.

-. TSCA 12(b) Export Notifications : Not listed.

5) Others

-. 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

16. OTHER INFORMATION

1. Reference

1) The Korea Occupational Safety and Health Agency ; KOSHA MSDS

2) Korea regulations

: Industrial Safety and Health Law, Waste Management Law, Toxic Chemical Control Act,

ENFORCEMENT DECREE OF THE WATER QUALITY AND ECOSYSTEM CONSERVATION ACT.

2. Issue date : 2010. 03. 12 (Full revision according to the GHS harmonized criteria)

3. Revision number and Last date revised : -

4. Written Authority : Chemtopia Co., Ltd. (http://www.chemtopia.net Tel. 02-826-9100)