

SAFETY DATA SHEET

Date Printed: January 20, 2020

Version: 3

Regulation: According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

1. Identification

1.1 Product identifier

1.1.1 Product name: MA

1.1.2 Other means of identification: Maleic anhydride, 2,5-Furandione

1.2 Recommended use of the chemical and restrictions on use

1.2.1 Recommended use: It is used for production of alkyl resin type, dye intermediates, formulation, agricultural chemicals(pesticides) etc.

1.2.2. Restrictions on use: Do not use for purposes other than those recommended

1.3 Details of the supplier of the safety data sheet

1.3.1 Manufacturer

Company name: Hanwha Solutions Co, Ltd.

Address: 22, Yongyeon-ro 230beon-gil, Nam-gu, Ulsan, Korea

Prepared by: plasticizer production team

Contact Telephone: +82-52-279-1024

1.3.2 Supplier & Distributor

Company name: Hanwha Solutions Co, Ltd.

Address: Hanwha Bldg., Janggyo-dong, Jung-gu, Seoul, Korea

Prepared by: PLS Sales Team

Contact Telephone: +82-2-729-2564

1.4 Emergency phone number

Emergency phone: +82-2-729-2564 (Sales) / +82-52-279-1024 (Plant)

2. Hazard(s) identification

2.1 Classification of the substance or mixture

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Physical / Chemical Hazards:

Not classified

Health Hazards:

Acute toxicity (oral) Category 4

Skin corrosion/irritation: Category 1

Eye damage /eye irritation: Category 1

Respiratory sensitization: Category 1

Skin sensitization: Category 1

Environmental Hazards:

Not classified

2.2 Label elements, including precautionary statements

o Pictogram and symbol:



o Signal word: Danger

o Hazard statements:

- H302 Harmful if swallowed.
- H314 Causes severe skin burns and eye damage.
- H318 Causes serious eye damage.
- H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H317 May cause an allergic skin reaction.

o Precautionary statements:

- Prevention:

- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P285 In case of inadequate ventilation wear respiratory protection.

- Treatment: Not applicable

- P301+P312 If swallowed: Call a poison center or doctor/physician if you feel unwell.
- P301+P330+P331 If swallowed: Rinse mouth. Do not induce vomiting.
- P302+P352 If on skin: Wash with plenty of soap and water.
- P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340 If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P304+P341 If inhaled: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P310 Immediately call a poison center or doctor/physician.
- P321 Specific treatment (Reference to supplemental).
- P330 Rinse mouth.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P342+P311 If experiencing respiratory symptoms: Call a poison center or doctor/physician.
- P363 Wash contaminated clothing before reuse.

- Storage:

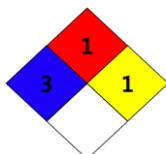
- P405 Store locked up.

- Disposal:

- P501 Dispose the contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazard information not included in hazard classification

(National Fire Protection Association; NFPA)



- o Health: 3
- o Flammability: 1
- o Reactivity: 1
- o Specific hazard: -

3. Composition/information on ingredients

Component	Common name and synonyms	CAS No.	Conc. / %
2,5-Furandione	Maleic anhydride	108-31-6	≥99.85

4. First-aid measures

4.1 Description of first aid measures

Eye contact

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Get immediate medical advice/attention.

Skin contact

- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- If skin irritation or rash occurs: Get medical advice/attention.
- For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
- Get immediate medical advice/attention.
- Remove and isolate contaminated clothing and shoes.
- For minor skin contact, avoid spreading material on unaffected skin.

Inhalation

- If inhaled: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Immediately call a poison center or doctor/physician.

Ingestion

- If swallowed: Call a poison center or doctor/physician if you feel unwell.
- If swallowed: Rinse mouth. Do not induce vomiting.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

4.2 Most important symptoms and effects, both acute and delayed

- Symptoms and effect: Serious irritation to the eyes and corrosion to the skin

4.3 Indication of immediate medical attention and notes for physician

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-fighting measures

5.1 Extinguishing media

- **Suitable extinguishing media:** Extinguishing powder, carbon dioxide, dry chemical, alcohol extinguishing agent
- **Unsuitable extinguishing media:** Most of the foam produces a corrosive toxic gas reacts with the substance.

5.2 Specific hazards arising from the chemical

- Thermal decomposition products: Irritating, corrosive and toxic gases
- Combustible material may be burned, but does not readily ignite.
- Vapours can form an explosive mixture of air and gas mixture.
- React with water (which may be reacted rapidly) to generate a flammable, toxic, or corrosive gases.
- If in contact with metal may create a flammable hydrogen gas.
- Vapours may move up and flame ignition source.

- Steam is diffused along the ground initially heavier than air and may accumulate in low areas, and confined spaces
- If containers exposed to heat or contamination in water, there is risk of explosion.

5.3 Special protective equipment and precautions for fire-fighters

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Substance may be transported in a molten form.
- Dike fire-control water for later disposal; do not scatter the material.
- Move containers from fire area if you can do it without risk.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Eliminate all ignition sources.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Cover with plastic sheet to prevent spreading.

6.2 Environmental precautions

- Prevent entry into waterways, sewers, basements of confined areas.

6.3 Methods and materials for containment and cleaning up

- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.

7. Handling and storage

7.1 Precautions for safe handling

- Wash thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Contaminated work clothing should not be allowed out of the workplace.
- Use only in a well-ventilated area.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Loosen closure cautiously before opening.
- Avoid prolonged or repeated contact with skin.
- Do not enter storage area unless adequately ventilated.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.

7.2 Conditions for safe storage, including any incompatibilities

- Store in a locked storage area.
- Empty drums are completely drained and properly prevents back into place immediately, please drums regulator properly placed.
- Keep away from food and drinking water.

8. Exposure controls/personal protection

8.1 Occupational Exposure limits

- o **ACGIH regulation:** TWA=0.01mg/m³(inhalable fraction and vapor)
- o **Biological exposure index:** Not available
- o **OSHA regulation:** TWA=0.25ppm(1mg/m³)
- o **NIOSH regulation:** TWA=0.25ppm(1mg/m³)
- o **EU regulation:**
 - Austria: TWA[TMW]=0.1ppm(0.4mg/m³), STEL[KZW]=0.2ppm(0.8mg/m³)
 - Belgium: TWA=0.1ppm(0.41mg/m³)
 - Czech Republic: TWA=1mg/m³
- o **Other:** Not available
 - China: TWA=1mg/m³, STEL=2mg/m³
 - Australia: TWA=0.25ppm(1mg/m³)
 - Indonesia: TWA=0.25ppm(1.0mg/m³)

8.2 Exposure controls

Appropriate engineering controls

- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the recommended exposure limit.
- Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Individual protection measures, such as personal protective equipment

Respiratory protection

- If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respiratory type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

Eye protection

- It is a good industrial hygiene practice to minimize eye contact. Wear a face shield when working with molten material.

Hand protection

- It is a good industrial hygiene practice to minimize skin contact. When material is heated, wear gloves to protect against thermal burns.

Body protection

- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Description:	Solid powder
Color:	Colorless or white
Odor:	Pungent odor
Odor threshold:	1.9 mg/m ³ (0.4 ppm)
pH:	2.24(1x10 ⁻² M), 2.62(5x10 ⁻³ M), 3.10(1x10 ⁻⁴ M)
Melting point/freezing point:	53 °C ~58 °C
Initial boiling point and boiling range:	200.1 °C(1013.7 hPa)
Flash point:	102 °C

Evaporation rate:	Nat applicable
Flammability (solid, gas):	Not flammable
Upper/lower flammability or explosive limits:	UEL 7.1%/LEL 1.4%
Vapor pressure:	15.1 Pa(22 °C)
Vapor density:	3.38(Air=1)
Relative density:	1.48 g/cm ³ (20 °C)
Solubility:	ca. 400g/L(20 °C)
Partition coefficient: n-octanol/water:	logKow=-2.61(19.8 °C, pH 4~9)
Auto-ignition temperature:	447 °C
Decomposition temperature:	>285~290 °C
Viscosity:	0.61(60 °C)

“NOTE: The physical data presented above are typical values and should not be construed as a specification”

10. Stability and reactivity

10.1 Reactivity/Chemical stability/Possibility of hazardous reactions:

- Stable under normal temperatures and pressures.
- No polymerization.

10.2 Conditions to avoid:

- Keep away from heat/sparks/open flames/hot surfaces.
- If container exposed to heat, it may rupture or explode.
- Is discharged into the river, please note so as not to cause an impact on the environment.

10.3 Incompatible materials:

- Metal, amine, metal salt, acid, base, combustion materials, oxidizing agent, reducing agent

10.4 Hazardous decomposition products: Carbon oxides

11. Toxicological information

Information on toxicological effects	
(a) Acute toxicity	
Oral	Category 4
	Rat, LD ₅₀ =1,090 mg/kg bw
Dermal	Not classified
	Rabbit, LD ₅₀ =2,620 mg/kg bw
Inhalation	Not classified
	Rat, LD ₅₀ >2.175mg/L 4h
(b) Skin Corrosion/ Irritation	Category 1
	Maleic anhydride (0.5 g) was applied to two intact skin locations on the backs of six rabbits for four hours. Severe skin irritation was present in both treated areas of most rabbits for the entire 7-day observation period.
(c) Serious Eye	Category 1

Damage/ Irritation	Maleic anhydride and maleic acid have been reported to be severely irritating to the eyes of rabbits. (Irreversible) (corneal opacity scores=3.8, chemosis scores=4.0)
(d) Respiratory sensitization	Category 1
	Maleic anhydride has been shown to be a possible respiratory sensitizer to rats.
(e) Skin Sensitization	Category 1
	Maleic anhydride has been shown to be a skin sensitizer to mouse. (OECD TG 429)
(f) Carcinogenicity	Not classified
	ACGIH: A4 - Not Classifiable as a Human Carcinogen
(g) Mutagenicity	Not classified
	<i>In vitro</i> : Bacterial Reverse Mutation Assay (<i>S. typhimurium</i>) with/without metabolic activation: Negative (OECD TG 471)
	<i>In vitro</i> : Mammalian Cell Gene Mutation Test with/without metabolic activation: Negative (OECD TG 476)
	<i>In vivo</i> : Mammalian Bone Marrow Chromosome Aberration Test: Negative (OECD TG 475)
(h) Reproductive toxicity	Not classified
	- In a two-generation reproductive toxicity study, with the exception of a few cases of respiratory rales, the clinical appearance and behaviour of all treated animals were not remarkably different from the controls. (NOAEL=55mg/kg/day) (OECD TG 416, GLP) - Respiratory involvement and red nasal discharge were observed in all dosage groups. The incidence of these was higher in the treated groups, though not in a dose-related pattern. (NOAEL≥140mg/kg bw/day) (OECD TG 414, GLP)
(i) Specific target organ toxicity (single exposure)	Not classified
	Signs of toxicity included sedation, increased diuresis, diarrhea and poor general condition. Rats in the 0.8 g/kg dose group showed no signs of toxicity and all animals survived. (OECD TG 401)
(j) Specific target organ toxicity (repeat exposure)	Not classified
	The high dose group appeared to be gaining weight at a rate slightly less than that of the control group during the last 2 months of the study (LOAEL=250 mg/kg bw/day) (OECD TG 408, GLP)
(k) Aspiration Hazard	Not available

12. Ecological information

12.1 Toxicity	Not classified
Acute toxicity	Fish: 96h LC ₅₀ (<i>Salmo gairdneri</i>)=75mg/L
	Crustacean: 48h EC ₅₀ (<i>Daphnia magna</i>)=42.81 mg/L(OECD TG 202) (read-across)
	Algae: 72h EC ₅₀ (<i>Pseudokirchnerella subcapitata</i>)=74.35mg/L (OECD TG 201) (read-across)
Chronic toxicity	Fish: Not available
	Crustacean: 21d NOEC (<i>Daphnia magna</i>)=10 mg/L 21d EC ₅₀ (<i>Daphnia magna</i>)=77 mg/L
	Algae: Not available

12.2 Persistence and degradability	Persistence: Low persistency (log Kow is lower than 4 estimated.) Log Kow=-2.61 Degradability: The half-life of the hydrolysis of maleic anhydride to maleic acid in water at 25°C has been determined to be approximately 22 seconds.
12.3 Bioaccumulative potential	Bioaccumulation: Bioaccumulation is expected to be low according to the BCF <500. (BCF=5.433) (Predicted) Biodegradation: Not available
12.4 Mobility in soil	Low potency of mobility to soil. (Koc=42)
12.5 Hazardous to the ozone layer	Not classified
12.6 Other adverse effects	Not available

13. Disposal considerations

13.1 Disposal method

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

13.2 Disposal precaution

Consider the required attentions in accordance with waste treatment management regulation.

14. Transport information

14.1 UN No.: 2215

14.2 UN Proper shipping name: MALEIC ANHYDRIDE

14.3 Transport Hazard classes:

ADR: 8

IMDG: 8

ICAO/IATA: 8

RID: 8

14.4 Packing group: III

14.5 Environmental hazards: Not applicable

14.6 Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not established

14.7 Special precautions for user

in case of fire: F-A

in case of leakage: S-B

15. Regulatory information

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture

USA Regulatory Information

TSCA (Toxic Substances Control Act): Section 8 (b) inventory (Present)

Proposition 65: Not regulated

OSHA Regulation: Not regulated

CERCLA Regulation: 5000 lb final RQ; 2270 kg final RQ

SARA 302 Regulation: Not regulated

SARA 304 Regulation: Not regulated

SARA 313 Regulation: Regulated

SARA 311/312 Regulation: Not regulated

Foreign Regulatory Information

Substance of Rotterdam Protocol: Not regulated

Substance of Stockholm Protocol: Not regulated

Substance of Montreal Protocol: Not regulated

Foreign Inventory Status

- Korea management information: Existing Chemical Substance (KE-17314)
- European management information: European Inventory of Existing Commercial Chemical Substances (EINECS): Present (203-571-6)
- Japan management information: Existing and New Chemical Substances (ENCS): Present ((2)-1101)
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (32340)
- Australia management information: Australia Inventory of Chemical Substances (AICS): Present
- Canada management information: Domestic Substances List (DSL): Present
- New Zealand management information: New Zealand Inventory of Chemicals (NZIoC): HSNO Approval: HSR001547
- Philippines management information: Philippines Inventory of Chemicals and Chemical Substances (PICCS): Present

16. Other information, including date of preparation or last revision**16.1 Indication of changes:**

- Preparation date: Jun 20, 2016
- Version: 3
- Revision date: January 20, 2020

16.2 Key literature reference and sources for data:

- National chemicals information systems; <http://ncis.nier.go.kr>
- Pubchem; <http://pubchem.ncbi.nlm.nih.gov/>
- AKRON; <http://ull.chemistry.uakron.edu/erd/>
- IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
- ECHA; <http://echa.europa.eu/web/guest>
- HSDB; <http://toxnet.nlm.nih.gov/>
- OECD SIDS; <http://webnet.oecd.org/>
- NIOSH(The National Institute for Occupational Safety and Health)
- ACGIH(American Conference of Governmental Industrial Hygienists)
- TOMES-LOLI@; <http://www.rightanswerknowledge.com/loginRA.asp>
- National Emergency Management Agency-Korea dangerous material inventory management system; <http://hazmat.mpss.kfi.or.kr/index.do>
- Waste Control Act enforcement regulation attached [1]
- EPISUITE Program ver.4.1

16.3 Abbreviations

- ACGIH: American Conference of Governmental Industrial hygienists
- NIOSH: The National Institute for Occupational Safety and Health
- OSHA: Occupational Safety & Health Administration
- IARC: International Agency for Research on Cancer
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- ICAO/IATA: International Civil Aviation Organization/ International Air Transport Association
- RID: Regulations Concerning the International Transport of Dangerous Goods by Rail

16.4 Other

- Product should be handled, stored, and used in accordance with the generally accepted industrial hygiene practices and in conformity with all the applicable legal regulations.

- The information provided herein is based on the knowledge possessed at this present time from the view point of safety requirements.
- It should, therefore, not be construed as guaranteeing specific properties.