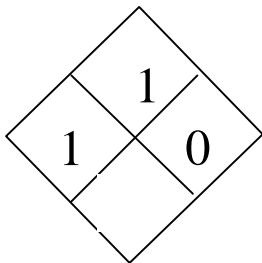


PRODUCT: MALEIC ANHYDRIDE

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HAZARDS DIAMMOND – NFPA 704

Fire 1 – risk in case of strong heating
Health 3 – very hazardous
Reactivity 1 – unstable under heating

1. IDENTIFICATION OF THE SUBSTANCE AND COMPANY

- Product name (label): Maleic Anhydride
- Name in English: Maleic Anhydride
- Supplier name, address and telephone number:
Elekeiroz S.A. (Várzea Paulista-SP Plant) - Rua Dr. Edgardo de Azevedo Soares, 392
CEP 13224-030
(00-55-11) 4596-8880 or (00-55-11) 4596-8788 or (00-55-11) 4596-8768(business hours)
(00-55-11) 4596-8800 or (00-55-11) 9961-4808 (24h)
Fax: (00-55-11) 4596-8881
E-mail (customer service):
elisabete.moskalenko@elekeiroz.com.br
carlos.villani@elekeiroz.com.br

2. COMPOSITION AND INFORMATION ON INGREDIENTS

- Common chemical name of the substance:
Maleic Anhydride
- Synonyms: Anhydride Cis-butenodioic Anhydride; 2,5-Furanedione; Toxylic Anhydride; 2,5-Dioxihydrofurane; Anhydride of Acid Maleic
- Register in *Chemical Abstract Service* (nº C.A.S):
[108-31-6]
- Ingredients that contribute to risk:
Maleic Anhydride > 99,5%, corrosive, Nº C.A.S.: [108-31-6]

3. HAZARD IDENTIFICATION

- Hazards and most important effects of the product:
Corrosive substance, irritant to skin and mucous membranes. Can cause chemical burns, and when there is contact with the molten product, it causes thermic burns.

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4. FIRST-AID MEASURES

- **Inhalation:**
Remove the exposed person to non-contaminated area and apply artificial respiration.
- **Contact with skin:**
Wash immediately the skin with plenty of water and soap. Contaminated clothing and shoes should be removed.
- **Contact with eyes:**
Wash the eyes with plenty of water during, at least, 15 minutes.
- **Ingestion:**
NO Induce vomiting. Keep the victim lying and warm. Do not give anything to drink if the person is unconscious.
- **Observation:** in any situation, the victim should be sent to emergency medical treatment.
- **Information to physician:**
If there is contact of molten maleic anhydride with the skin, it will cause severe thermic burn. The product will solidify and form a crust over the affected area. This crust should be removed manually, and it should be administered treatment for thermic burns of same size and depth. Intubation, if necessary. Signs and symptoms of mucous membranes irritation can occur in cases of acute exposure to the product. Doubling vision, photophobia or sensation of seeing rings around lights can come from repeated moderate exposures or brief acute exposure. Inhalation for prolonged periods can cause bronchospasms in individuals with predisposition.
Ingestion: induce to vomit and, later, administer two soup spoons of activated carbon diluted in water. In case of aggression to other apparatuses or systems, call an expert.

5. FIRE-FIGHTING MEASURES

- **Proper extinguishing media:**
Light fire: dry powder, CO₂, and water fog or mechanical foam.
Intense fire: water fog or mechanical foam.
Dry powder cannot be used, because it contains Sodium. See item 10.
- **Specific hazards:**
Combustible product, but does not ignite easily. Flammable and toxic gases can accumulate indoors. Fire can cause emission of irritant and toxic gases. Water resulting from firefighting and dilution waters cannot be released directly to bodies of water.
- **Specific methods and firemen protection:**

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Remove containers from the fire area, if this can be done without risk. Cool with water the side parts of the containers exposed to flames, long time after the fire is extinguished. Evacuate personnel in the affected area. People involved in firefighting should wear self-contained apparatus and full protection clothing.

6. ACCIDENTAL RELEASE MEASURES

- Special precautions:
Keep away bystanders, isolate the risk area, remove sources of ignition and forbid the entrance of persons. Avoid dust formation (solid product). Keep on the wind and keep away from low areas. Do not touch the spilled material. Contain the spill, if this can be done without risks. Avoid contact of the product with skin, eyes and respiratory system, wearing personal protective equipment, mentioned in item 8.
- Environment precautions:
- Solid product spills: collect with a clean shovel, put in clean, dry vessels and close them. Remove them from the spill area.
- Cleaning methods:
Follow the recommendations above mentioned.

7. HANDLING AND STORAGE

- Handling (technical measures)
Wear safety equipment, according to item 8. Avoid dust formation and buildup. Do not smoke or take meals in the area. At the slightest sign of contact with the product, proceed according to item 4, first aid measures.
- Storage (technical measures)
Solid:
Keep the product in well closed packages, in a dry and ventilated area. Do not reuse empty packages. Because the product is hygroscopic, it is not advisable its storage for long periods, in order to avoid acidity increasing and aggregation due to crystallization bridges. Put the product in polypropylene packages.

Molten:
Store in 316 stainless steel tanks, grounded with inert atmosphere by using nitrogen and keep temperature between 60 and 65°C, but not higher than 80°C.
General Recommendations:
Protect the area against physical damages and isolate from incompatible substances (see item 10). Empty containers/tanks of the product can be hazardous since they keep residues (dusts/particulates). Protect the area and tanks against static electricity. Empty containers, only under inert or non-flammable atmosphere, due to the risk of fire or explosion caused by static electricity. Storage area should have adequate ventilation.

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8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

- Specific control parameters:
Governmental Decree 3214/78, Standard Regulating NR-15: there is no limit.
ACGIH-TLV/TWA (revision 2005) = 0,1 ppm / 40 week hours (for chemical substance)
Particulate non classified under other manner (PNOS) = 3,0 mg/m³ (dust)
- Environmental assessment
Non classified particulate under other manner (PNOS): monitor with PVC membrane, 5,0 micra, provided with nylon cyclone. Analytical technique: gravimetry.
- Personal protective equipment:
 - Solid product:
Full facial mask with supplied air to product condicionamento indoors. Full facial mask with filter for organic vapours outdoors and during load and unload operations. Single canvas overalls with long sleeves and hood. Latex or PVC gloves. Safety leather shoes with rubber impermeable sole.
 - Molten produc:
Full facial mask with filter for organic vapours, scrap trousers and jacket, scrap glooves and safety leather shoes.
 - Selfcontained apparatus, in case of emergency involving fire.
- Other information:
 - closed areas should be provided with gases exhaustion equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

- Physical state:
 - Solid: white crystalline, strong odor
 - Liquid: colourless, strong odor
- pH: not available
- Specific temperatures where occur physical state changes:
 - Boiling point (760 mmHg): 202.0°C.
 - Melting point: 53°C
- Flash point:
 - Open cup: 110 °C
 - Closed cup: 102°C
- Auto-ignition temperature: 476.67°C.

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- Explosion limits:
Lower: 1.4% per air volume
Upper: 7.1% per air volume.
- Vapour pressure: °C: 44 52 60 80 100
MmHg: 1 3 4 11 26
- Vapor density (air = 1): 3,4
- Liquid density: °C: 25 40 52 60 80
mmHg: 1.47 1.39 1.32 1.31 1.29
- Solubility (at 25°C (g/100g of solvent):
Ketone: 227.0
Ethyl Acetate: 112.0
Chlorophorm: 52.5
Benzene: 50.0
Toluene: 23.4
Orto-xylene: 19.4
Carbon Tetrachloryde: 0.6
Kerosene: 0.25
Water: slow hydrolisis. 16.3 g/100ml (25°C)

10. STABILITY AND REACTIVITY

- Specific conditions:
The product is considered stable under normal conditions of handling and storage. Reacts exothermically with moisture producing Acid Maleic, which is corrosive to iron, carbon steel and other metals (except stainless steel).
Does not present polymerization risk, but it can happen uncontrolled co-polymerization when mixed with olefines and catalysts. A decomposition “explosive polymerization” can occur when in presence of alkalis, alkaline metals and earthy-alkaline, ammoniac or amines, when heated above 150°C. The concentration of these impurities necessary to initiate the decomposition is below than 200 ppm. The exothermic reaction will occur quickly and the released gas can cause equipment rupture, unless it is provided with relief device.
- Incompatible substances:
 - Explosion decomposition: alkaline metals, piridine
 - Exothermic decomposition: amines, alkalis, quinoline, sodium potassium
 - Contact with strong oxidizers can cause fire and explosion

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- Conditions to avoid:
Moisture, heat, ignition sources, incompatible materials. Use of sodium or potassium carbonate and sodium and ammonia hydroxide for cleaning and washing equipment that later will contain maleic anhydride, due to explosion possibility.
- Hazardous decomposition products:
Carbon Monoxide, Carbon Dioxide can be formed from the heat of decomposition.

11. TOXICOLOGICAL INFORMATION

- Acute toxicity and local effects:
Contact with the skin: Phthalic Anhydride usually does not cause burning sensation immediately after contact, specially if the skin is dry. However, it can cause redness and severe dermatitis if it is not removed through washing. During tests with guinea pigs the product caused redness 48 hours after exposure and visible destruction of the skin 7 days later, at 4 hours exposure.
Contact with eyes: eyes are sensitive to dust and vapours of the product. A prolonged exposure in a atmosphere rich in vapours can cause doubling vision, conjunctivitis, temporary loss of vision and, even, severe erosion of the cornea.
Inhalation: vapour and dust of maleic anhydride are very irritant and an acute exposure is not voluntarily tolerated, causing strong headaches, nausea, nose bleeding, throat irritation, pulmonar irritation, coughing, edema and bronchospasms.
Ingestion: it can cause throat pain, abdominal pain, vomit, and burns in the digestive tract.
- Chronic toxicity:
Repeated exposure can cause contact dermatitis, skin sensibilization, cronic eye irritation, ulceration in nasal mucosa and occupational asthma.
- Medical conditions aggravated by overexposure:
People who suffer of chronic respiratory systems inflammation, sinusitis, chronic bronchitis and asthma show more suscetibility to toxicity caused by successive exposures.
- Toxicological parameters:
Acute effect:
LD₅₀: 481mg/kg (rat-oral);
LD₅₀: 2620 mg/kg (rabbit-skin);
Rabbit, 1% (eyes) - severe

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12. ECOLOGICAL INFORMATION

- Environmental effects, behavior and product impacts:
When released to air, soil or water, the product probably will hydrolyze forming Acid Maleic. When released to soil, the material will biodegrade. When released to water, the material will not significantly evaporate and, probably, will biodegrade quickly. When released to air, the material will probably remain in aerosol form during short period of time, and will not form wet deposits, being biodegradable due to the reaction of ozone and the production of hydroxile radicals photochemically. The material does not have significant bioaccumulation.

13. DISPOSAL CONSIDERATIONS

- Treatment and disposal methods of the product, wastes and used packages:
Any wastes treatment should be in accordance to local and national regulation.

14. TRANSPORT INFORMATION

- National and international regulation:
Follow regulation for road transportation for hazardous products according to Decree n° 96044, 05/18/88 and ANTT 420/04 (Brazil).
Follow regulation for railroad transportation for hazardous products according to decree n° 98973, 02/21/90 (Brazil).
Follow Mercosul regulation for hazardous products transportation according to decree n° 1797, 01/25/96.
- Road transportation (Brazil and MERCOSUL):
Proper shipping name: Maleic Anhydride
Hazard class: 8 (corrosive)
Hazard number: 80
UN number: 2215
Packing group: III
- US DOT (terrestrial USA)
Proper shipping name: Maleic Anhydride
Hazard class: 8
UN/NA: UN 2215
Packing Group: III
Label: Corrosive (8)

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- IATA (international, aerial)
Proper shipping name: Maleic Anhydride
Hazard class: 8
Packing Group: III
Maleic Anhydride, molten: forbidden
- IMO/IMDG (international, maritime)
Proper shipping name: Maleic Anhydride
Hazard class: 8
Packing Group: III
Limited Quantities: 5 kg.
E m S: F-A, S-B

15. REGULATORY INFORMATION**EPA Regulations:****RCRA 40 CFR:** Listed U147 Toxic Waste**CERCLA 40 CFR 302.4:** Listed per CWA Section 311(b)(4), per RCRA Section 3001 5000 lb (2268 kg)**SARA 40 CFR 372.65:** Listed**SARA EHS 40 CFR 355:** Not listed**TSCA:** Listed**EPA** – Environmental Protection Agency**SARA** - Superfund Amendments and Reauthorization Act**RCRA** - Resource Conservation and Recovery Act**CERCLA** - Comprehensive Environmental Response, Compensation, and Liability Act**TSCA** - Toxic Substances Control Act

Transportation: follow item 14.

Consult related national and international regulation.

Consult Brazilian Standards related to the product.

16. OTHER INFORMATION

References:

- MSDS - GENIUM PUBLISHING CORP. (ficha n.º FUR1000, revision july/04);
- ACGIH, 2005.

Observation:

The information contained in this MSDS are offered in good faith and, as a orientation instrument, without incurring in expressed or implicit liability. In case of additional information or explanations, consult the supplier.