MATERIAL SAFETY DATA SHEET

Product name: FYROL 6
Product id: 7040
Revision date: 17/08/2011
Supersedes: 08/02/2009
Revision: 2

1. Identification of the substance & the company

Chemical name: Diethyl bis(hydroxyethyl) aminomethyl phosphonate
Chemical family: Alkyl phosphonate
Type of product and use: Flame retardant
Supplier: ICL-IP America Inc.
622 Emerson Road - Suite 500
St Louis, Missouri 63141, USA
Tel:(314)983-7884 Fax:(314)983-7607

Emergency Telephone: Chemtrec (800)424-9300

2. Hazards identification

Emergency overview: Combustible
May be harmful if inhaled

NFPA Ratings (Scale 0-4):
Health = 1, Fire = 2, Reactivity = 0.

HMIS Ratings (Scale 0-4):
Health = 1, Fire = 2, Reactivity = 0.

3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphonic acid, [[bis(2-hydroxyethyl)amino]methyl]-, diethyl ester</td>
<td>2781-11-5</td>
<td>85 - 95</td>
</tr>
</tbody>
</table>
## 4. First-aid measures

| Eye contact | Holding the eyelids apart, flush eyes promptly with copious flowing water for at least 20 minutes. Get medical attention immediately. |
| Skin contact | Remove contaminated clothing. Wash skin thoroughly with mild soap and plenty of water for at least 15 minutes. Wash clothing before re-use. Get medical attention if irritation occurs. |
| Inhalation | In case of inhalation, remove person to fresh air. Keep him quiet and warm. Apply artificial respiration if necessary and get medical attention immediately. |
| Ingestion | If swallowed, wash mouth thoroughly with plenty of water. Get medical attention immediately. |

**NOTE:** Never give an unconscious person anything to drink.

**Notes to the physician**

Treat symptomatically and supportively.

## 5. Fire - fighting measures

| Suitable extinguishing media | Water, water fog, carbon dioxide (CO2), dry chemical, foam |
| Fire fighting procedure | Contain runoff to prevent entry into water or drainage systems. Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA). |
| Unusual fire and explosion hazards | This material is combustible and can form ignitable, explosive air/vapor mixtures. Take precautionary measures against static discharges. When heated to decomposition, may release poisonous fumes of Carbon Monoxide, Carbon Dioxide, Phosphorus Oxides and Nitrogen Oxides. |

## 6. Accidental release measures

| Personal precautions | Wear appropriate safety clothing and eye/face protection (see Section 8) |
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Methods for cleaning up
Collect in suitable and properly labeled containers. Absorb on sand or vermiculite and place in closed container for disposal. Ventilate area and wash spill site after material pickup is complete.

Environmental precautions
Prevent product from entering drains, ditches and rivers.

7. Handling and storage

Handling
Avoid bodily contact.
Keep containers tightly closed.

Storage
Store in a dry, cool, well-ventilated area away from incompatible materials (see "materials to avoid").
Noncorrosive to glass or metals. May soften or deteriorate certain plastics and elastomers (vinyl-based resins, neoprene and natural rubbers).
Maximum recommended storage temperature of 50°C (122°F)

8. Exposure controls / personal protection

Exposure Limits:

<table>
<thead>
<tr>
<th>Components</th>
<th>ACGIH-TLV Data</th>
<th>OSHA (PEL) Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphonic acid, [[bis(2-hydroxyethyl)amino]methyl]-diethyl ester 2781-11-5</td>
<td>Not determined</td>
<td>Not determined</td>
</tr>
</tbody>
</table>

Ventilation requirements
Adequate ventilation is recommended to control potential employee exposure.

Personal protective equipment:
- Respiratory protection
  In case of insufficient ventilation wear suitable respiratory equipment.
- Hand protection
  Protective gloves
- Eye protection
  Chemical safety goggles
- Skin and body protection
  Use protective clothing impervious to this material.

Hygiene measures
Safety shower and eye bath should be provided. Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking.
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9. Physical and chemical properties

- **Appearance**: Clear liquid
- **Color**: Amber
- **Boiling point/range**: 196°C (385°F)
- **Melting point/range**: Not determined
- **Flash point**: 67.7°C (154°F) (closed cup)
- **Flammable/Explosion limits**: Not explosive
- **Ignition temperature**: 388°C
- **Auto-ignition temperature**: Not self-ignitable
- **Vapour pressure**: 25 Pa (20°C)
- **Viscosity**: 185 cP (25°C)
- **Solubility in water**: Soluble
- **Solubility in other solvents**: Alcohol, Ketones
- **Bulk density**: 9.6 lbs/gal @ 20°C
- **Density**: 1.16 g/ml (20°C)
- **pH**: 6.0 mg KOH/g (Acid Number)
- **Decomposition temperature**: 172°C

10. Stability and reactivity

- **Stability**: Stable under normal conditions. The product will decompose and release ethanol upon heating. Acids may form if heated above 275°F (125°C)
- **Materials to avoid**: Strong oxidizers and strong bases
- **Decomposition**: Under wet alkaline or acidic conditions, this material hydrolyses slowly at normal temperatures
- **Conditions to avoid**: Exposure to moisture, Heating above decomposition temperature
- **Hazardous decomposition products**: Phosphorus oxides, Carbon monoxide, carbon dioxide and nitrogen oxides
- **Hazardous polymerization**: Not expected to occur

11. Toxicological information

- **Acute toxicity**:
  - Rat oral LD50: > 5000 mg/kg
  - Rabbit dermal LD50: > 2000 mg/kg
  - Eye irritation (rabbit): Minimal irritant
11. Toxicological information

- Dermal irritation (rabbit) Not irritant
Dermal sensitization No data

Effects of overexposure: Exposure to ethanol vapors may cause eye irritation and respiratory tract irritation and central nervous system depression including headache, nausea and dizziness.

Sub-chronic toxicity: Daily oral administration of 20, 100 or 500 mg/kg to rats for three months produced increased relative liver and kidney weights in the high dose males and in the mid and high dose females. Hepatocellular hypertrophy was observed in the mid and high dose males and females. No evidence of toxicity was observed in the males and females administered 20 mg/kg/day.

Chronic toxicity Not available

Mutagenicity Not mutagenic by the Ames Test
Mutagenic in the mouse lymphoma forward mutation assay
Mutagenic in cytogenetic analysis
In vitro transformation of BALB/3T3 cells assay: negative

Carcinogenicity Not included in NTP 11th Report on Carcinogens
Not classified by IARC
Not classified as a carcinogen by USA OSHA

Reproductive toxicity Repeated exposure to Fyrol 6 did not adversely affect reproductive performance, fertility, litter size, pup size, pup weights, or the male or female organs. This study confirms the product is not a reproductive toxin.
NOAEL; 750 mg/kg/day

Neurotoxicity This product, when administered once orally (12.3 g/kg) to hens, produced slight unsteadiness, non-vocal behavior, diarrhea and no mortality. Two doses (1 or 10 g/kg) orally administered twice to hens 21 days apart did not produce any evidence of delayed neurotoxicity.

12. Ecological information

Aquatic toxicity:
- 96 Hour-LC50, Fish > 10,000 mg/L (Rainbow Trout)
- 48 Hour-LC50, Daphnia magna > 1000 mg/L
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Toxicity to micro-organisms
Activated sludge respiration inhibition test: EC50 > 10,000 mg/l
- Hydrolysis
  Stable under acidic conditions (half-life: > 100 days).
  Moderately stable under neutral conditions (half-life: < 100 days).
  Unstable under alkaline conditions with degradation increasing with increasing temperature.

Biodegradation
Not readily biodegradable

Germany, water endangering classes (WGK)
1

13. Disposal considerations

Waste disposal
Observe all federal, state and local environmental regulations when disposing of this material

14. Transportation information

DOT
NA1993
Class: 3 - Combustible liquid, n.o.s. (contains ethanol)
Packing Group: III

Not regulated for surface and air transport in non-bulk (<119 gallons) packagings.

IMO
Not regulated

ICAO/IATA
Not regulated
### 15. Regulatory information

**USA**
Reported in the EPA TSCA Inventory.

- **SARA 313**
  This product does not contain a chemical listed at or above de minimis concentrations.

- **California-Prop 65**
  This product does not contain any ingredient known to the State of California to cause cancer or reproductive toxicity as listed under the State drinking Water and Toxic Enforcement Act of 1986.

- **Waste Classifications**
  This material does not meet RCRA’s characteristic definition of ignitability, corrosivity, or reactivity, and is not listed in 40CFR 261.33.

- **Workplace Classification**
  This product is considered hazardous under the OSHA Hazard Communication Standard (29CFR 1910.1200).

**Canada**
Listed in DSL

- **WHMIS hazard class**
  B3 combustible liquids
  D2B toxic materials

**EU**
Reported in EINECS

**Japan**
Listed in ENCS

**Australia**
Listed in AICS

**China inventory**
Listed in IECSC

**Korea**
Listed in ECL

**Philippines**
Listed in PICCS

### 16. Other information

**GHS**
Product is not subject to classification according to GHS. No label elements required

This data sheet contains changes from the previous version in section(s)
1, 2, 3, 7, 11, 15
Health, Safety & Environment Policy
We will strive to ensure that our operations and products meet the needs of the present global community without compromising the ability of future generations to meet their needs.
We accept that the success of our business is dependent on the supply of products and services that will benefit society whilst ensuring human safety and protection of the environment and natural resources.
Within the framework of our commitment to the Responsible Care program, we will provide a healthy and safe work environment for employees and will responsibly manage our products at all stages of their life cycle in order to protect human health and the environment whilst maintaining high production standards of operation.

TO MEET THIS COMMITMENT WE WILL:
Comply with or exceed applicable national and international regulatory requirements and other requirements to which we subscribe.
Communicate openly and actively encourage dialogue with employees, customers and community concerning our products and operations.
Implement documented management systems consistent with and for promotion of the Responsible Care ethics.
Develop and supply products that can be manufactured, transported, used and disposed of safely whilst best meeting the needs of our customers.
Regularly assess, continually improve and responsibly manage health, safety and environmental risks associated with products and processes throughout their life-cycles.
Share knowledge and expertise with others and seek to learn from and incorporate improved practices into our own operations.
Educate and train employees, contractors and customers to improve their HSE performance.
Communicate up-to-date information to enable our workers, customers and other interested parties to handle our products in a safe and environmentally responsible manner.
Endeavor to work with customers, suppliers, distributors and contractors to foster the safe use, transport and disposal of our chemicals.
Support Product Stewardship programs in cooperation with customers, distributors and transporters.

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Prepared by: HERA Division in ISRAEL
telephone: +/972-8-6297835
telefax: +/972-8-6297832
www.icl-ip.com
e-mail: msdsinfo@icl-ip.com

End of safety data sheet