Unamine compounds are high molecular weight tertiary amines. These long chain alkyl imidazolines (glyoxalidines) react on an equimolar basis to form salts with organic and inorganic acid, alkyl halides, and alkyl benzyl-halides, etc. They have excellent surface active properties because they are hydrophobic and they dissolve in and readily emulsify (W/O) such non-polar solvents as kerosene and mineral oil. In acid solutions they are increasingly hydrophilic becoming excellent emulsifiers for polar solvents and semi polar solvents such as xylene and pine oil.

### Product

<table>
<thead>
<tr>
<th>Product</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unamine O</td>
<td>1-hydroxyethyl, 2-heptadecenyl imidazoline</td>
</tr>
<tr>
<td>Unamine C</td>
<td>1-hydroxyethyl, 2 coco imidazoline</td>
</tr>
</tbody>
</table>

### Typical Properties

<table>
<thead>
<tr>
<th></th>
<th>Unamine C</th>
<th>Unamine O</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Imidazoline</td>
<td>85 Min.</td>
<td>85 Min.</td>
</tr>
<tr>
<td>Amine Value</td>
<td>200 – 225</td>
<td>160 – 175</td>
</tr>
<tr>
<td>Color (Gardner)</td>
<td>4 Max.</td>
<td>11 Max.</td>
</tr>
</tbody>
</table>

### Physical Properties

- **Appearance**: Clear, Free From Foreign Material
- **Color**: Lt Yellow, Lt Brown
- **% Moisture (Karl Fischer)**: 0.1 Max, 0.1 Max.
- **Molecular Weight**: 286, 350
- **Freezing / Melting Point, °C**: 0, -5
- **Specific Gravity @ 60°F**: 0.94, 0.93
- **pH (2% solution)**: 10.5, 10.5
- **Flash Point (Setaflash Closed Tester (ASTM D3278))**: >212 F. (100 C), >230 F. (110 C)
- **Boiling Point**: 446 °F (230 °C), > 680 F. (360 C)
- **Density**: 0.94 g/cm³, 0.92 g/cm³
- **Water Solubility**: dispersible, dispersible

Unamine compounds are soluble in mineral oil, vegetable oils, mineral and organic acids.

The seller makes no warranty, expressed or implied, concerning the accuracy of any results to be obtained from the use of this information and no warranty is expressed or implied concerning the use of these products other than indicated within. The buyer assumes all risks of use and/or handling. No statement is intended or should be construed as a recommendation to infringe any patent.
APPLICATIONS

Acid Detergents

Unamine C and O are recommended for use in acid cleaning of dairy cans for removal of mild stone, beer stone, and organic matter, used in concentrations of 0.1% - 0.2% in phosphoric acid, gluconic acid or lactic acid. These amine salts are good grease emulsifiers, and have an anti-corrosive effect and germicidal activity.

Other acid detergency applications where the Unamine Amines are suitable include:

- Toilet bowl cleaning (formulated with sodium bisulfate or hydrochloric acid solution.)
- Metal cleaning emulsions (formulated with kerosene or xylene and dilute phosphoric acid.)
- Rust removers (formulated with oxalic acid or phosphoric acid.)

Agricultural Sprays

Unamine O is compatible with arsenates and nicotine sulfate. Unamine O also may be used with pyrethrum and phenothiazine concentrates, for which it is an excellent emulsifier.

Diesel Oil sprays for mosquito control effective at 8 to 10 gallon per acre may be prepared with 1 to 2 pounds Unamine O per 100 pounds oil.

Flotation

Unamine O is suggested for use in removing traces of silica from gypsum intended for use in glass ceramics, and for removing silica from low grade iron ores.

The hydrochloride of Unamine O has been successfully for separating silica and iron oxide from barite.

Metals

Mineral oil emulsions made with Unamine O adhere strongly to metal surfaces and show improved water repellency. An interesting characteristic of emulsions made with Unamine O is their stability in the presence of calcium (as in hard water) or aluminum cations or acids as strong as 5% hydrochloric – conditions which usually break ordinary emulsion. Because of this, Unamine O can be used in such applications as acid treating of oil wells and the protection of amphoteric metals with acid oil emulsions.
Corrosion Inhibiting Properties: Static Water Drop Test
Regal Oil B

<table>
<thead>
<tr>
<th>PPM Additive</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10 min. Oleic Acid 96 hrs.</td>
</tr>
<tr>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>Unamine O plus 250 Oleic Acid 336 hrs.</td>
</tr>
<tr>
<td>125</td>
<td>Unamine O plus 125 Oleic Acid 16 hrs.</td>
</tr>
<tr>
<td>125</td>
<td>Unamine C plus 125 Oleic Acid 335 hrs.</td>
</tr>
<tr>
<td>2000</td>
<td>Unamine O 1 hr.</td>
</tr>
<tr>
<td>2000</td>
<td>Unamine C 1 hr.</td>
</tr>
</tbody>
</table>

Paints

The bonding properties of many paints, enamels, lacquers and other organic coatings have been improved through the use of Unamine O. This cationic compound renders hydrophilic moist surfaces more receptive to the coating.

The adhesion and water resistance of sealers for cement and concrete floors may be improved by the addition of 0.25 to 0.5% of Unamine O to the asphalt base.

Pigment Flushing

Non-aqueous pigment dispersions are of importance in the manufacture of linoleum, paints, enamels, inks, and other coatings. These dispersions may be prepared either by (1) grinding the desired color in the oil vehicle, or by (2) flushing or transferring the water-wet pigment directly into the organic medium.

These pigments may be rendered hydrophobic by treatment with Unamine O; they will then be readily wetted by linseed oil, mineral oil, waxes, mineral spirits, plasticides, etc.

The Unamine O is added to the pigment press cake or paste. The amount of Unamine O needed will vary from 0.25% to 15% of the weight of the pigment (depending on the nature of the pigment and the particle size). Where complete removal of water is necessary, the flushed pigment dispersion may be passed over heated rollers.

Printing Inks

Printing inks containing 0.5% to 3.0% of Unamine O are improved in stability and show less tendency to bleed into surrounding paper.
Rubber Processing

Amines have found several applications in rubber processing for which the Unamine Amines and their salts may be suited. Derivatives have been made for use as retarders for fast curing butyl rubbers to reduce scorching, as curing accelerators in other rubbers, in acid emulsion polymerization, and as softening and plasticizing agents.

Textile Processing

Unamine amine salts or their quaternary derivatives are excellent cationic compounds for use in the textile industry.

Unamine O has excellent solubility and wetting out properties in carbonizing baths of sulfuric acid, hydrochloric acid, aluminum chloride, etc. They may also be used in acid fueling and acid scouring.

The addition of 0.1% to 0.5% of Unamine O to acid dye baths speeds the pick up of direct dyes on Nylon.

Fabrics pretreated with Unamine Amine salts will exhaust anionic lattices and other anionic emulsion; these coatings show improved adhesion and wash fastness.

The addition of Unamine O to solvent solutions of resin coating improves the penetration and adhesion of the resin or plastic to the fabric.

The silicofluoride of Unamine O is suggested for moth proofing.

Petroleum

Petroleum oils can be removed in many ways by the addition of Unamine Amines and derivatives thereof. Oil soluble quaternary ammonium compounds can be easily prepared by reacting Unamine Amines with alkyl halides, substituted benzyl halides, etc, Unamine Amines form oil soluble salts with organic phosphoric acids, alkyl phosphoric esters, alkyl sulfates, stearic acid, naphthenic acid, oleic acid, etc. Solubility in polar and non-polar solvents depends on the molecular weight and configuration of the acid. Unamine O has been found to give the best results.

Unamine C has been found to have outstanding properties in oil well acidifying and secondary recovery where its corrosion inhibiting and fungicidal action are of importance.

Unamine O and the fatty acid salts are valuable fuel oil additives imparting detergent, anti-icing, and sludge dispersion properties.

Complexes of the fatty Unamine Imidazolines are used as emulsion breakers in crude petroleum processing. In the manufacture of bentonite greases, 0.5% - 2.0% Unamine O may be blended with 2% - 10% bentonite into mineral oil at 100°C in a colloid mill for improved results.
Suggested Used for Unamine O and Derivatives as Petroleum Additives:

- Corrosion Inhibitor
- Oil Emulsion Breaker
- Mineral Oil Emulsifier
- Asphalt Anti-stripping Compound
- Marine Engine Lubricant
- Spark Plug Thread Lubricant
- Penetrating Oils
- Sludge Inhibitor for Fuel Oils
- Mold and Fungi Inhibitor
- Oil Soluble Detergents
- Water Resistant Bentonite Greases
- Pipe Line Anti-static Agents

Regulatory Status

TSCA: All components are listed on the EPA TSCA 8(b) inventory list.

California Proposition. 65 Components: This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Unamine C</th>
<th>Unamine O</th>
</tr>
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<tbody>
<tr>
<td>61791-38-6</td>
<td></td>
<td>27136-73-8</td>
</tr>
</tbody>
</table>

Safety and Toxicology

Refer to Lonza Material Safety Data Sheet.

Packaging

Unamine C is packed into 400 lb. net steel closed head unlined drums. Unamine O is packed into 430 lb. net steel closed head unlined drums.

Shelf Life

Unamine C and Unamine O have a shelf life of five years from the date of manufacture. Keep container tightly closed. To maintain product quality, do not store in heat or direct sunlight. Keep in a dry, cool and well-ventilated place. Protect from frost.

Manufacturing Location

Williamsport, PA USA

For questions or for more information please e-mail Technical Sales Support at contact.allendale@lonza.com or call (800) 365-TECH (8324).