THE DEGREASING POWER OF STEPOSOL® M-8-10

STEPOSOL® M-8-10 is a multi-functional ingredient that offers both the penetrating power of a solvent, and the low surface tension of a surfactant.

PRODUCT ATTRIBUTES

Chemistry: N, N-dimethyloctanamide and N, N-dimethyldecanamide (made from biorenewable short chain (C8-10) methyl esters and dimethyl amine)
Form @ 25°C: Clear liquid
Stability: Heat and hydrolysis stable
LVP-VOC*: Low vapor pressure (LVP) VOC exempt
Solubility: Excellent solubility in organic solvents

For aqueous degreasing, an alkaline pH of 11-12 is more favorable than a neutral pH of 7-8. In the example below, one would expect the alkaline pH formulation to outperform the neutral pH formulation. The addition of 0.5% STEPOSOL® M-8-10 in a neutral pH formulation showed improved performance over the 0.5% Dipropylene Glycol n-Butyl Ether in an alkaline pH formulation.

RESULTS

<table>
<thead>
<tr>
<th>INITIAL</th>
<th>AFTER 2 SETS OF SPRAY</th>
<th>AFTER 3 SETS OF SPRAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEPOSOL® M-8-10</td>
<td>Dipropylene Glycol n-Butyl Ether</td>
<td>STEPOSOL® M-8-10</td>
</tr>
</tbody>
</table>

EXPERIMENTAL DETAILS

1. Polymerized vegetable oil was mixed with Gardner ASTM D4488-95 A5 particulate. The soil was dissolved and dispersed in Isopropyl Alcohol and applied to enamel tiles.
2. 0.5% of the comparative solvents were formulated into an aqueous degreaser containing surfactant, builder and solvent. STEPOSOL® M-8-10 was tested in a neutral pH formulation with a Sodium Citrate builder and the Glycol Ether in an alkaline pH formulation with a Sodium Carbonate builder.
   - Neutral formulation: 0.5% solvent, 0.2% Sodium Citrate, 1% BIO-SOFT® N91-6
   - Alkaline formulation: 0.5% solvent, 0.2% Sodium Carbonate, 1% BIO-SOFT® N91-6
3. The formulas were sprayed onto the tiles set in a vertical position, allowing the product to run down the tile. Three (3) sprays were applied to each side of the tile simultaneously. Spraying was repeated a total of three (3) times at thirty (30) second intervals.

New CARB VOC Limit for General Purpose Degreasers

STEPOSOL® M-8-10 is a LVP-VOC* exempt solvent. It may be your solution to improved performance and compliance with California Air Resources Board (CARB) Consumer Products Regulation.

A new VOC limit of 0.5% for General Purpose Degreasers (non-aerosol) is effective as of December 31, 2012.

* LVP-VOC is defined as a compound that meets one of the following criteria: 1) The compound has a vapor pressure of less than 0.1 mm Hg at 20°C; 2) the compound has more than 12 carbon atoms, or a mixture comprised solely of compounds with more than 12 carbon atoms, and the vapor pressure is unknown or 3) the compound has a boiling point greater than 216°C.

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June 2012
ALL PURPOSE SPRAY AND WIPE CLEANER #1180

Description:
This mildly alkaline spray-and-wipe formulation is a fast-acting cleaner that penetrates oily soils for easy removal. Its low alkalinity makes it suitable for many common household surfaces.

Formulation:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>% by Weight</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deionized Water</td>
<td>97.9</td>
<td>Diluent</td>
</tr>
<tr>
<td>BIO-SOFT® D-40</td>
<td>1.0</td>
<td>Anionic Agent</td>
</tr>
<tr>
<td>BIO-SOFT® N91-6</td>
<td>0.4</td>
<td>Emulsifier</td>
</tr>
<tr>
<td>STEPOSOL® M-8-10</td>
<td>0.5</td>
<td>Solvent</td>
</tr>
<tr>
<td>Sodium Citrate</td>
<td>0.2</td>
<td>Builder</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Procedure:
1. Charge Deionized Water.
2. With good agitation, add Sodium Citrate.
4. Continue mixing until homogenous.
5. Blend in STEPOSOL® M-8-10.
6. Mix until homogenous.

Physical Properties:

- Appearance, as is: Clear liquid
- pH, as is: 8.2
- Viscosity @ 25°C, as is: Water thin
- Storage/Stability: Pass
- Freeze thaw, 3 cycles:
  - 1 month at 50°C: Stable
  - 1 month at 25°C: Stable
  - 1 month at 5°C: Stable

Instructions for Use:
Spray on soiled surface. Wipe clean with a sponge or cloth.

87% soil removed

BIO-SOFT® N91-6 and BIO-SOFT® D-40 are approved ingredients on www.cleangredients.org.
For further information, visit www.cleangredients.org or Stepan's website, www.stepan.com.