



VertecBio ELSOL™ - MAKR

Patent Pending Blend of Biobased Solvents

- 100% Biobased Replacement for Methyl Amyl Ketone (MAK)
- Better Cleaning Power and Reduced Solvent Usage vs. Methyl Amyl Ketone
- Precision Cleaning Solvent, Dries Completely and Leaves No Residue
- High Performance, Versatile Solvent Blend for Formulations
- Excellent Solvency for Paint, Coating and Ink Formulations
- 20% - 30% More Efficient in Viscosity Reduction than MAK
- Provides Excellent Flow Characteristics When Used in Formulation
- Easy and Inexpensive to Distill/Recycle
- High Loading Capacity
- 100% Biodegradable to Carbon Dioxide and Water
- Sustainable Chemistry – No Impact on Global Warming (“Carbon Neutral”)
- EPA Approved SNAP Solvent – No Ozone Depleting Chemicals
- No Environmentally Hazardous Ingredients
- Safe, Non-Toxic, Non-Carcinogenic
- No HAP’s – No Hazardous Air Pollutants
- Manufactured in the United States

GENERAL PHYSICAL PROPERTIES

VERTECBIO ELSOL-MAKR

Flash Point .103 F ASTM D3278 (Setaflash)
Vapor Pressure.....6.4 mmHg @ 68 F
PH of Water Dispersion.....4
Specific Gravity.....0.939
Evaporation Rate.....0.25
Boiling Point Range.....111°-154°F

10/27/08



Vertec BioSolvents ELSOL™-MAKR Performance Sheet

Suggested Replacement for Methyl Amyl Ketone (MAK)

Introduction

Methyl Amyl Ketone's largest use is in industrial coatings applications, extrusion, wood furniture and fixtures, containers and closures, automotive finishes and machinery. Formulators have been seeking an alternative to these hazardous solvents due to employee exposure concerns and increased legislative pressure geared toward reducing the use of these solvents.

Vertec BioSolvents suggests a replacement blend with renewable, carbon neutral biobased solvents. These biobased solvents are derived from corn, soybeans, citrus fruits and other renewable feedstocks, and have reduced toxicity profiles.

Reformulation Solvents

| | |
|-----------------------------|--------------------------|
| Hazardous Solvents | Methyl Amyl Ketone (MAK) |
| BioBased Replacement | ELSOL™-MAKR |

The solvent blend shown is only a suggested starting point for developing alternative systems. All blends should be thoroughly evaluated to determine suitability for specific applications

| | Relative Evaporation Rate | Flash Point(°F) | Hansen Solubility Parameters | | | Total |
|--------------------------|---------------------------|-----------------|------------------------------|------------|------------|-------------|
| | | | Dispersion | Polar | H Bonding | |
| ELSOL™ -MAKR | 0.25 | 103 | 7.7 | 3.4 | 6.7 | 10.8 |
| Methyl Amyl Ketone (MAK) | 0.34 | 117 | 7.9 | 2.7 | 4.9 | 9.7 |

Reformulation Solvents Typical Properties

| Blend | Environmental | Uses | Comments |
|---------------------|---------------------|---------------------|---------------------------|
| ELSOL™- MAKR | Non Hap | Paint, coatings | Renewable, carbon neutral |
| | Non SARA reportable | cleaners, adhesives | Reduced toxicity profile |

Conclusion

Formulators and applicators are looking for alternatives to hazardous solvents as more regulations are enforced. This can be seen in many industries including paint and coatings, adhesives and inks. Formulators are not only feeling the pressures at the federal and state level, but abroad as well. The suggested replacements using the sustainable, carbon neutral, biobased solvents above should assist in meeting your performance requirements and the regulatory challenges.

10/27/08



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Methyl Amyl Ketone (MAK) Replacement

Specifications

| Item | Unit | Specification |
|------------------|---------------------------|---|
| Appearance | | Clear, substantially Free From Suspended Matter |
| Specific Gravity | 20/20° C | 0.939 |
| Acidity | Wt % as Acetic Acid, Max. | 0.05 |
| Purity | Wt % Min. | 99.5 |
| Water Content | Wt % Max. | 0.2 |
| Viscosity | cps @ 20° C | 2.7 |
| Color | PtCO, Max | 10 |

Physical Properties

| Item | MAKR |
|------------------------------|--------------|
| Molecular Weight | 98.78 |
| Specific Gravity 20/20° C | 0.939 |
| Boiling Point | 111° - 154°F |
| Flash Point | 103°F |
| Viscosity @ 20° C (cps) | 2.7 |
| Evaporation Rate | 0.25 |
| Vapor Pressure, mm Hg, @20°C | 6.4 |