

Coatings Market Technical Tip TT-87A Diisobutyl Ketone (DIBK) Solvent Substitution Options

DIBK is typically manufactured as a co-product of MIBK. Since it is not made deliberately, DIBK can sometimes be in short supply. The purpose of this technical tip is to illustrate how Eastman™ MAK (methyl n-amyl ketone) or Eastman™ MIAK (methyl isoamyl ketone) can be used as potential solvent or solvent blend substitutes for DIBK (diisobutyl ketone).

DIBK is an active solvent for a variety of synthetic resins. It is unique in that it provides an excellent balance of the following key properties:

- Solvency
- Evaporation rate
- Density
- Water miscibility
- Surface tension

While there are no other solvents that precisely match the properties of DIBK, *Eastman* MAK and MIAK are very

similar. In addition to being active solvents for a wide variety of resins, *Eastman* MAK and MIAK are relatively slow to evaporate, have low densities and surface tensions, and low water miscibility.

In applications where matching the evaporation rate and the solvency of DIBK are critical to the formulation, using blends of solvents with slower evaporation rates may be necessary. By blending *Eastman* MAK or MIAK with slower evaporating solvents, such as Eastman™ EEP (ethyl 3-ethoxypropionate) and Eastman™ 2-EHA (2-ethylhexyl acetate), formulators are able to adjust the solvent blend to suit their requirements.

Table 1 shows a comparison of suggested DIBK replacements based on performance. The blend ratios are adjusted to match the evaporation rate of DIBK. Table 2 lists the properties of each solvent or solvent blend.

Table 1: Performance of Suggested Replacements When Compared to DIBK

Key Properties	Performance Benefit	Eastman™ MAK or MIAK/EEP 50/50 Blend	Eastman™ MAK or MIAK/2-EHA 80/20 Blend	Eastman™ MAK	Eastman™ MIAK
High solvency	Lower viscosities at higher solids level	Equal	Better	Better	Better
Slow evaporation rate	Good flow and leveling Reduced surface defects Blush resistance	Equal	Equal	Slightly faster	Slightly faster
Low density	Reduced VOC	Slightly higher	Equal	Equal	Equal

Table 2: Solvent Properties

Solvent	DIBK Weight%	Eastman™ MAK or (MIAK) / EEP Blend Weight%	Eastman™ MAK or (MIAK) / 2-EHA Blend Weight%	Eastman™ MAK Weight%	Eastman™ MIAK Weight%
Eastman™ DIBK (Diisobutyl Ketone)	100	—	—	—	—
Eastman™ MAK (Methyl n-Amyl Ketone)	—	50	80	100	—
Eastman™ EEP Solvent (Ethyl 3-Ethoxypropionate)	—	50	—	—	—
Eastman™ MIAK (Methyl Isoamyl Ketone)	—	(50)	(80)	—	100
Eastman™ 2-Ethylhexyl Acetate	—	—	20	—	—
Total	100	100	100	100	100

Hansen Solubility Parameters

Hydrogen bonding	2	3.1	2.1	2	2
Dispersion	7.6	7.9	7.9	7.9	7.6
Polar	1.8	2.2	2.5	2.8	2.8
Total	8	8.8	8.5	8.6	8.3

Key Properties

Relative evaporation rate (n-butyl acetate = 1)	0.193	0.197	0.175	0.4	0.5
Density (lb/gal)	6.76	7.36	6.89	6.8	6.76
Solubility (wt% in water/water in @ 20°C)	0.05/0.7	2.9/2.2 ^a	0.03/0.55 ^a	0.5/1.3	0.5/1.2
Surface tension (dynes/cm @ 20°C)	24.6	26.5	26.0	26.1	25.8
Hazardous air pollutant	no	no	no	no	no

^aSolubility data is for the slower solvent of the blend

Summary

Eastman is a leading provider of solvents to a variety of industries and helping our customers meet their solvent needs is what we do. This technical tip is intended to help guide formulators that are looking for solvent substitution

options for DIBK. If additional assistance is needed, contact 800-EASTMAN and ask to speak with your technical service representative.



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