

# Eastman solvents—performance sheet

## Suggested replacements for toluene

### Introduction

Toluene's largest single use is in industrial coating applications, mainly in wood furniture and fixtures, containers and closure, automotive finishes and machinery (see Table 1). With increasing legislative pressure geared towards reducing toluene usage, many formulators have been seeking alternative solvents.

Table 1 Toluene applications

Application	End use %
Coatings, paint, and lacquers	54
Adhesives	17
Other (including cleaners)	22
Inks (primarily gravure inks)	5
Pharma	1

Tables 2 and 3 show Eastman's suggested replacement blends for toluene and their typical properties.

Table 2 Reformulation blends<sup>a</sup>

Solvent	Control volume %	Blend #1 volume %	Blend #2 volume %	Blend #3 volume %	Blend #4 volume %
Toluene	100	—	—	—	—
Eastman MPK <sup>b</sup> (methyl <i>n</i> -propyl ketone)	—	—	80	—	—
Isopar <sup>™</sup> C <sup>c</sup>	—	—	—	—	30
Eastman IBIB (isobutyl isobutyrate)	—	—	—	9	—
Eastman isobutanol (isobutyl alcohol)	—	20	—	—	—
Eastman isobutyl acetate	—	50	20	91	70
Aliphatic hydrocarbon	—	30	—	—	—
Total	100	100	100	100	100

<sup>a</sup>These solvent blends are only suggested starting points for developing alternative systems. They should be thoroughly evaluated to determine their suitability for specific application.

<sup>b</sup>MPK (methyl *n*-propyl ketone) is not on EPA's HAP or SARA list, but it does contain <=10 wt% MIBK, which is on both lists.

<sup>c</sup>Exxon Manufacturing

Table 3 Reformulation blends—typical properties

Typical properties	Control volume %	Blend #1 volume %	Blend #2 volume %	Blend #3 volume %	Blend #4 volume %
R.E.R. (relative evaporation rate)	1.902	1.764	2.083	1.242	1.866
Hansen solubility parameters					
Dispersion	8.8	7.4	7.72	7.4	7.37
Polar	0.7	1.46	3.32	1.764	1.26
Hydrogen bonding	1.0	3.11	2.46	3.082	2.17
Total	8.884	8.159	8.756	8.208	7.785

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Suggested replacements for toluene *(Continued)*

Table 4 Key points—Eastman’s replacement blends vs. toluene

Blend	Environmental	Uses	Comments
<b>Blend #1</b>	<ul style="list-style-type: none"> <li>– Non-HAP</li> <li>– Non-SARA reportable</li> <li>– Lower toxicity concerns</li> </ul>	<ul style="list-style-type: none"> <li>– Cleaners</li> <li>– Inks</li> <li>– Nitrocellulose lacquers</li> </ul>	Addition of aliphatic hydrocarbon helps lower cost.
<b>Blend #2</b>	<ul style="list-style-type: none"> <li>– Non-HAP</li> <li>– Non-SARA reportable</li> </ul>	<ul style="list-style-type: none"> <li>– Automotive</li> <li>– Coil</li> <li>– Architectural interior</li> </ul>	MPK provides the versatile solvency and helps contribute to a lower VOC versus other types of solvents with similar evaporation rate.
<b>Blend #3</b>	<ul style="list-style-type: none"> <li>– Non-HAP</li> <li>– Non-SARA reportable</li> </ul>	<ul style="list-style-type: none"> <li>– Wood furniture</li> <li>– Auto refinish</li> </ul>	IBIB brings excellent blush resistance which is important especially for wood coatings and stains.
<b>Blend #4</b>	<ul style="list-style-type: none"> <li>– Non-HAP</li> <li>– Non-SARA reportable</li> </ul>	<ul style="list-style-type: none"> <li>– Thinners</li> <li>– Sealants</li> <li>– Lacquers</li> <li>– Varnishes</li> </ul>	Isopar™ C lowers the solvency to help minimize elastomer swelling in adhesives and rubber goods.

## Conclusion

Today’s formulators and applicators are looking for toluene alternatives as more regulatory rules are promulgated and enforced. Examples can be seen in a variety of industries including adhesives, inks, paint, and coatings. A specific example is the EPA’s (Environmental Protection Agency) focus on the wood furniture industry because it is one of the largest OEM consumer markets for solvent use. Formulators and applicators are not only seeing pressures at the federal and state level but abroad as well. The suggested replacements should assist formulators and applicators in their requirements to meet regulatory challenges.



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