Eastman Solvents Technical Tip

Selecting an Effective Replacement for *Exxate* 600 (TT-16A)

Introduction

Several options (Table 1) are available to the formulator for replacing *Exxate* 600 (oxo-hexyl acetate esters). It is possible that some may be used as a direct substitute thus minimizing reformulating cost. In other systems, it may be necessary to adjust the solvent balance of the coating to satisfy the requirements of the specific end use. For additional reformulating assistance in replacing *Exxate* 600 and/or other solvents, visit Eastman's Solvent Reformulation Request Wizard at www.eastman.com. Physical properties for each replacement and *Exxate* 600 are shown in Table 1.

Blend 1: 79.6 wt% *Eastman* MAK : 20.4 wt% *Eastman* 2-Ethylhexyl Acetate
Blend 2: 79.4 wt% *Eastman* n-Butyl Propionate : 20.6 wt% *Eastman* 2-Ethylhexyl Acetate
Blend 3: 79.6 wt% *Eastman* IBIB : 20.4 wt% *Eastman* 2-Ethylhexyl Acetate

Table 1: Physical Properties

	Eastman **EEP**	**Blend 1**	**Blend 2**	**Blend 3**	***Exxate*** **600**[a]
Evaporation Rate (n-Butyl Acetate = 1)	0.12	0.17	0.17	0.17	0.17
Weight/Volume, lb/gal	7.91	6.90	7.29	7.16	7.30
Surface Tension, dynes/cm @ 20°C	27.0[b]	25.9	25.9	25.9	25.0
Water Solubility, wt% @ 20°C					
In Water	2.9	<0.4	<0.2	<0.1	0.01
Water In	2.2	1.0	0.6	0.5	0.6
Electrical Resistance, megohms	20	0.6	>20	>20	>20
Hansen Solubility Parameters[c]					
NonPolar	7.9	7.9	7.7	7.5	7.7
Polar	1.6	2.5	1.6	1.4	1.4
Hydrogen Bonding	4.3	2.1	2.8	2.8	2.9
Total	9.1	8.5	8.3	8.1	8.4
Urethane Grade[d]	Yes	Yes (both)	Yes (both)	Yes (both)	Yes
Hazardous Air Pollutant[e] (HAP)	No	No (both)	No (both)	No (both)	No

[a] *Exxonmobil*
[b] *At 23°C*
[c] *Shown as* $[cal/cm^3]^{½}$
[d] *Water content is 0.05% maximum.*
[e] *Title III of the Clean Air Act Amendments (CAAA) of 1990*

Solvent activity is very important among solvent property requirements. The more active the solvent, the less is required to reach the desired coating application viscosity. This is extremely important today since VOC regulations usually specify the solvent content of a coating in g/L or lb/gal. Solvent activity is shown in Table 2.

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Table 2: Resin Solubility[a]

	Weight % N.V.	*Eastman* EEP	Blend 1	Blend 2	Blend 3	*Exxate* 600
Acrylamac HS 232-2980[b]	70	671	571	661	738	691
Duramac HS 057-5720[c]	65	718	635	741	893	792
Eastman CAB-381-0.5[d]	8	54	27	39	I	48
Elvacite 2010[e]	20	315	I	I	I	I
Epon 1007F[f]	50	3720	2070	I	I	I
Polymac HS 057-5776[g]	65	237	166	199	272	250
R ½-sec Nitrocellulose[h]	8	80	19	25	40	48

[a]*Brookfield Viscosity @ 25°C, cP - ASTM D2196*
[b]*Hexion Specialty Chemicals – The acrylic resin is supplied at 80-wt% solids in MAK. The acrylic was then diluted to 70-wt% solids with solvent shown.*
[c]*Hexion Specialty Chemicals – The alkyd resin is supplied at 75-wt% solids in a 90/10-wt% MPK/n-Butyl Acetate blend. The alkyd was then reduced to 65-wt% solids with solvent shown.*
[d]*Eastman Chemical Company*
[e]*Lucite International*
[f]*Resolution Performance Products*
[g]*Hexion Specialty Chemicals – The polyester resin is supplied at 85-wt% solids in PM Acetate. The polyester was then reduced to 65-wt% solids with solvent shown.*
[h]*Green Tree Chemical Technologies, Inc.*

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