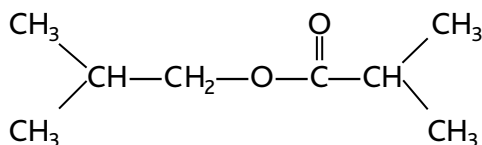


# Solvents

## Eastman isobutyl isobutyrate (IBIB)



### Introduction

Eastman isobutyl isobutyrate (IBIB) is an economical ester retarder solvent that is used in nitrocellulose lacquers, coatings for plastic substrates, and high-solids coatings. The major features of this product are its urethane-grade quality, ideal evaporation rate as a retarder solvent for

nitrocellulose lacquers, good solvent activity for numerous polymers, low weight/gallon, low water miscibility, low surface tension, high electrical resistance, and low solvent crazing of plastic substrates.

Table 1 Comparison of properties of Eastman retarder solvents

	IBIB <sup>a</sup>	PMA <sup>b</sup>	MAK <sup>c</sup>	EEP <sup>d</sup>	<i>n</i> -BuOPr <sup>e</sup>
Urethane grade	Yes	Yes	Yes	Yes	Yes
Evaporation rate <i>n</i> -BuOAc = 1	0.4	0.4	0.4	0.12	0.5
Ethyl ether = 1	30.2	30.2	30.2	100.8	24.2
Blush resistance, % relative humidity @ 26.7°C (80°F)	92	92	93	94	—
Weight/volume @20°C (68°F) kg/L	0.86	0.97	0.82	0.95	0.87
lb/gal	7.13	8.06	6.80	7.91	7.30
Water miscibility, wt% In water	<0.1	20.0	0.5	2.9	0.4
Water in	0.2	5.9	1.3	2.2	0.7
Surface tension, Dynes/cm, @ 20°C (68°F)	23.2	26.4	26.1	27.0 (@ 23°C)	25.3
Electrical resistance, megohms	>20	5	0.4	20	>20

<sup>a</sup>Eastman isobutyl isobutyrate

<sup>b</sup>Eastman PM acetate

<sup>c</sup>Eastman methyl *n*-amyl ketone

<sup>d</sup>Eastman EEP solvent

<sup>e</sup>Eastman *n*-butyl propionate

## Solvents

### Eastman isobutyl isobutyrate (IBIB) (Continued)

## Urethane grade

IBIB is a urethane-grade solvent with very low water miscibility which aids in maintaining its urethane-grade quality during proper storage.

## Ideal evaporation rate as a retarder solvent for nitrocellulose lacquers

The evaporation rate (0.4) of IBIB enables formulators to design lacquer coatings with relatively fast dry-to-touch time combined with excellent blush resistance.

## Good solvent activity for many polymers

As a high-boiling, branched-chain ester solvent, IBIB has good solvent activity for polymers such as nitrocellulose, polyesters, alkyds, acrylic copolymers, amino resins, isocyanates, polyamides, and chlorinated rubber, as shown in Table 2. IBIB offers low cost and good application characteristics to a diverse range of coatings.

Table 2 Polymer solution viscosities in Eastman retarder solvents

Polymer	Viscosity @ 25°C, cP (mPa·s)					
	Wt%	IBIB	PMA	MAK	EEP	n-BuOPr
RS ½-sec nitrocellulose	8	100	64	25	80	109
High-solids polyester Polymac™ HS 5776	65	212	254	123	210	155
Alkyd Duramac™ HS 5720	65	898	785	581	752	1,140
Melamine Cymel™ 303 resin	50	8	10	7	14	7
Isocyanate Desmodur™ N-100 resin	50	15	18	11	31	15
Polyamide Versamid™ 115 resin	75	3,300	3,250	4,000	3,650	PS <sup>a</sup>
High-solids acrylic Joncryl™ 587 resin	60	20,900	11,200	3,150	8,750	15,617
Methyl methacrylate/butyl methacrylate acrylic Paraloid™ B-66 resin	40	4,150	3,000	580	2,800	878
Methyl methacrylate acrylic Elvacite™ 2010 resin	20	INS <sup>b</sup>	275	220	315	INS
Epoxy Epon™ 1001F resin	50	INS	240	82	190	117
Vinyl Ucar™ VYHH	10	INS	67	16	PS	INS
Phenoxy Paphen™ PKHH	25	INS	2,600	INS	2,300	INS
Cellulose acetate butyrate CAB-381-0.5	8	INS	43	20	54	116

<sup>a</sup>Partially soluble

<sup>b</sup>Insoluble

## Solvents

### Eastman isobutyl isobutyrate (IBIB) *(Continued)*

#### Low weight/gallon

IBIB has one of the lowest weight/gallon (7.13 pounds) of any ester solvent available. EPA guidelines limit the maximum weight of a solvent for a given volume of coating; therefore, solvents with lower density contribute to lower VOC.

#### Exempt under SARA III, Section 313, and HAPs regulations

In the United States, Xylene emissions are reportable under SARA, Title III, Section 313 (TRI list), and Title III of the Clean Air Act Amendments of 1990 (HAPs). A blend of IBIB and VM&P™ naphtha (56.4/43.6 weight) is an effective xylene replacement in many coating formulations. Isobutyl acetate should be substituted for some or all of the VM&P™ naphtha when the aliphatic hydrocarbon tolerance of the coating is low or when additional solvent activity is needed.

However, in electrostatically applied coatings, where xylene is used to adjust electrical resistance, a 60/20/20 blend of IBIB, isobutyl acetate, and VM&P™ naphtha or an 80/20 blend of *n*-butyl acetate and IBIB may be more effective as replacements.

#### Low water miscibility

With low water miscibility, IBIB is an excellent retarder solvent for moisture-sensitive coatings such as polyurethanes. However, if a slower retarder solvent is required for a polyurethane coating, Eastman EEP solvent affords an improved balance of properties while maintaining low moisture sensitivity.

#### Low surface tension

High-solids coatings tend to have higher surface tension than low-solids coatings. High surface tension can be a contributing factor to poor coating atomization, poor wetting of the substrate, or film defects such as craters, fish eyes, and edge pull. One way to reduce the surface tension of a high-solids coating is to use a low-surface-tension solvent such as IBIB.

#### High resistivity

IBIB has high electrical resistance, which is helpful in adjusting the resistivity of a coating applied electrostatically. Generally, alcohols and ketones (low resistivity) are used in high-solids coatings to maintain package stability and lower viscosity. The addition of IBIB to high-solids coatings should enable formulators to adjust electrical resistance without sacrificing package stability and/or application viscosity.

#### Low solvent crazing of plastics

In coatings for plastic substrates, many retarder solvents with high activity have a tendency to craze the plastic surface and lower its impact strength. Because of its balance of evaporation rate and good solvent activity, IBIB is useful as a retarder solvent in coatings for plastic substrates that are sensitive to solvent attack.

## Solvents

### Eastman isobutyl isobutyrate (IBIB) *(Continued)*

## Resin suppliers

Paraloid™ B-66 methyl methacrylate/butyl methacrylate acrylic resin	Dow Chemical Company
CAB-381-0.5 cellulose acetate butyrate	Eastman Chemical Company
Cymel™ 303 melamine resin	Cytec
Desmodur™ N-100 isocyanate resin	Bayer Material Science
Duramac™ HS 5776	PCCR USA
Elvacite™ 2010 methyl methacrylate acrylic resin	Lucite
Epon™ 1001F epoxy resin	Momentive
Joncryl™ 587 acrylic resin	BASF
Paphen™ PKHH phenoxy resin	Phenoxy Associates
Polymac™ HS 5720	PCCR USA
RS ½-sec nitrocellulose	Various suppliers
Versamid™ 115 polyamide resin	BASF
Ucar™ VYHH vinyl resin	Dow Chemical Company



**Eastman Chemical Company  
Corporate Headquarters**

P.O. Box 431  
Kingsport, TN 37662-5280 U.S.A.

Telephone:  
U.S.A. and Canada, 800-EASTMAN (800-327-8626)  
Other Locations, (1) 423-229-2000  
Fax: (1) 423-229-1193

**Eastman Chemical Latin America**

9155 South Dadeland Blvd.  
Suite 1116  
Miami, FL 33156 U.S.A.

Telephone: (1) 305-671-2800  
Fax: (1) 305-671-2805

**Eastman Chemical B.V.**

Fascinatio Boulevard 602-614  
2909 VA Capelle aan den IJssel  
The Netherlands

Telephone: (31) 10 2402 111  
Fax: (31) 10 2402 100

**Eastman (Shanghai) Chemical  
Commercial Company, Ltd. Jingan Branch**

1206, CITIC Square  
No. 1168 Nanjing Road (W)  
Shanghai 200041, P.R. China

Telephone: (86) 21 6120-8700  
Fax: (86) 21 5213-5255

**Eastman Chemical Japan Ltd.**

MetLife Aoyama Building 5F  
2-11-16 Minami Aoyama  
Minato-ku, Tokyo 107-0062 Japan

Telephone: (81) 3-3475-9510  
Fax: (81) 3-3475-9515

**Eastman Chemical Asia Pacific Pte. Ltd.**

#05-04 Winsland House  
3 Killiney Road  
Singapore 239519

Telephone: (65) 6831-3100  
Fax: (65) 6732-4930

[www.eastman.com](http://www.eastman.com)

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