

EASTMAN

Eastman EastaPure™
electronic chemicals

EP solvent

Eastman EastaPure™ electronic chemicals

EP solvent

Eastman EastaPure™ EP solvent is a high flash point, water miscible, colorless solvent providing slow evaporation rate and good viscosity control for a broad range of polymers, resins and coatings. It is completely water miscible over a wide range of temperatures making it a very good coupling solvent for resin/water systems. Miscible with most organic solvents, EastaPure™ EP can be blended to provide customized formulation properties necessary for specialty applications. In addition, it has a milder, less detectable odor than most glycol ethers.

Eastman EastaPure™ EP solvent has excellent solvent activity and is an active solvent for many resins, some of which include:

- Cellulose acetate butyrate
- Melamine
- Epoxy
- Phenolic
- Urea
- Nitrocellulose
- Isocyanate
- Polyamide
- Alkyd
- Vinyl chloride acetate
- Acrylic
- Vinyl butyral
- Thermoset acrylic

The combination of slow evaporation rate and good solvent activity makes it an effective retarder solvent for use in semiconductor developers, thinners, edge cleaning and cleaners. In a semiconductor photolithography process, it can be used as a major component in photoresist stripping formulations and to pattern thin films. It is suitable for post etch cleaning products, edge bead removers and high temperature, large area applications.

Elimination of impurities is critical to avoid conductivity and corrosion in the electronic industry. During the process steps in device production, silicon wafers are subjected to various chemical treatments. In developer solutions, which are utilized to develop an exposed photoresist pattern in base circuit elements, effective solvents have been found to play a vital role in providing a resist pattern which avoids pattern collapse, even at small features and line widths. Photoresist,

> High-purity specifications (low trace metals) are given in Table 1.

Table 1: Special properties^a Upper limits for trace metals

Component	Upper Limit (parts/billion)
Aluminum (Al)	100
Barium (Ba)	100
Cadmium (Cd)	100
Calcium (Ca)	100
Chromium (Cr)	100
Cobalt (Co)	100
Copper (Cu)	100
Gallium (Ga)	100
Germanium (Ge)	100
Iron (Fe)	100
Lead (Pb)	100

Component	Upper Limit (parts/billion)
Lithium (Li)	100
Magnesium (Mg)	100
Manganese (Mn)	100
Nickel (Ni)	100
Potassium (K)	100
Silver (Ag)	100
Sodium (Na)	100
Strontium (Sr)	100
Titanium (Ti)	100
Zinc (Zn)	100

^aListed in the Sales Specification.

when exposed to high temperatures or plasma treatments, can be extremely difficult to remove due to an increase in very fine pattern densities and wafer diameters. Eastman EastaPure™ EP solvent, with its high solvent activity and flash-point, is designed to address these and other significant challenges in the formation and processing of photo-lithography substances and other electronics applications.

> Typical properties and regulatory classifications are shown in Table 2.

Table 2: Typical properties^a

Assay, wt % min	99.5
Color (Pt-Co scale), max.	10
Wt/vol @ 20°C, kg/L (lb/gal)	0.91 (7.59)
Solubility	
In water, @ 20°C	Complete
Water in, @ 20°C	Complete
Evaporation rate	
(n-Butyl acetate = 1)	0.02
(ether = 1)	60.5
Dilution ratio	
Toluene	4
VM&P Naphtha	2
Refractive index @ 20°C	1.414
Vapor density (air = 1)	3.6
Vapor pressure	
@ 20°C	1.3 mm Hg
55°C	2.2 Kpa
Specific gravity @ 20/20°C	0.913
Boiling point @ 760 mm Hg, °C (°F)	
Initial	149.5 (301)
Dry point	153 (308)
Freezing point, °C (°F)	< -90 (< -130)
Flash point, Tag Closed Cup, °C (°F)	49 (120)
Fire point, °C (°F)	56 (133)
Autoignition temperature, °C (°F)	235 (455)
Azeotropes	
BP, °C (°F)	98.5 (209.3)
Wt % water	73
Hansen solubility parameters	
Nonpolar	7.9
Polar	4.2
Hydrogen bonding	6.6
Total	11.1
Surface tension @ 25°C, dynes/cm	27.9
Electrical resistance, megohms	0.1
Critical temperature, °C	308.8
Critical pressure, ATM	36.2
Critical volume, mL/g-mol	347
Expansion coefficient, per °C @ 20°C	0.0009
Heat of vaporization, cal/g-mol	11,060
Heat of combustion, kcal/g-mol	-704.8
Nitrocellulose solubility	Active
Maximum incremental reactivity (MIR)	0.07
Liquid viscosity @ 25°C, cP (mPa-s)	2.4
Liquid heat capacity @ 27°C, cal/g-mol (°C)	44.51

^aUnless noted otherwise, all tests are run at 23°C (73°F) and 50% relative humidity. Properties reported here are typical of average lots. Eastman makes no representation that the material in any particular shipment will conform exactly to the values given.

EASTMAN

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.

AIG 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

Material Safety Data Sheets providing safety precautions, that should be observed when handling and storing Eastman products, are available online or by request. You should obtain and review the available material safety information before handling any of these products. If any materials mentioned are not Eastman products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed.

Neither Eastman Chemical Company nor its marketing affiliates shall be responsible for the use of this information, or of any product, method or apparatus mentioned, and you must make your own determination of its suitability and completeness for your own use, for the protection of the environment and for the health and safety of your employees and purchasers of your products. NO WARRANTY IS MADE OF THE MERCHANTABILITY OR FITNESS OF ANY PRODUCT, AND NOTHING HEREIN WAIVES ANY OF THE SELLER'S CONDITIONS OF SALE.

EastaPure and Eastman are trademarks of
Eastman Chemical Company.

© Eastman Chemical Company, 2008.