

## TECHNICAL INFORMATION

### SPECTROCERTIFIED® THIN-FILM SAMPLE SUPPORT WINDOW MATERIALS

A thin-film sample support window is a substance used for retaining liquid, powdered, slurry or solid specimens in XRF Sample Cups. Of the many different types of materials available, few possess the necessary combination of consistency and chemical and physical properties to serve x-ray spectrochemical needs.



Typical Thickness Variations

Variations	Uniformity of Thickness	Orientation
Between packages	≤1 – 2%	Multiaxially orientated; minimizes effects of preferred orientation
Between lots	≤± 5%	

### Physical Characteristics

Thin-Film Substances	Melting Point, °C (°F)	Density, gm/cc	Structural Formula
Etnom®	270 (518)	1.36	C14H10O4
Prolene®	165 (329)	0.91	C3H6
Mylar®	260 (500)	1.38	C10H3O4
Polypropylene	160 (320)	0.91	C3H6
Ultra-Polyester™	210 (410)	0.93	C10H3O4
Polyimide (Kapton®)	None Reported	1.42	C20H10O5N2
Polycarbonate	267 (513)	1.37	C2H3F

### Purity

Thin-Film Substance	Trace Impurities, PPM
Mylar®, Ultra-Polyester™	Ca, P, Sb, Fe, Zn
Prolene®, Polypropylene	Ca, P, Fe, Cu, Zr, Ti, Al
Etnom®	Si, Ca, P, Zn, Sb
Polyimide (Kapton®)	Unknown
Polycarbonate	Unknown

### Chemical Resistance Chart

CHEMICAL	MYLAR	POLY-CARBONATE	ETNOM	POLY PROPYLENE	POLYIMIDE (KAPTON®)	PROLENE	ULTRA POLY-ESTER™
Acid, dilute or weak	G	G	G	E	N	G	G
Acids, conc.	G	G	G	E	N	E	G
Alcohols, aliphatic	N	G	G	E	G	E	N
Aldehydes	U	F	F	E	E	E	U
Alkalies, conc.	N	N	G	E	E	E	N

### What's New

- Exhibitions
- Clinics and Workshops
- Suggested Reading Material
- Reference Standard Sources
- Data Bases
- XRF Instrument Manufacturer's Showcase
- XRF Sample Cups and Accessories
- Grinding Machines and Accessories
- Briquetting Presses and Accessories
- Grinding/Briquetting Additives
- Fusion Machines and Accessories
- Petrochemical Oil Standards
- PE and PVC Polymer Compliance Standards

### Thin-Film Sample Supports

- Technical Data
- How to Select Thin-Films
- Continuous Rolls/Precut Circles
- SpectroMembrane® Carrier Frames
- Microporous Pressure Equalizing Film Accessories
- RoHS Compliant Thin Films
- Microporous Film
- RoHS European Council Directive 2002/95/EC
- Technical Reprints
- NEW easy search engine. Type in an item and search!

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Esters	N	N	F	G	G	G	N
Ethers	F	N	F	N	U	N	F
Aliphatic Hydrocarbon	G	N	E	G	E	G	G
Aromatic Hydrocarbon	N	N	E	N	E	N	N
Hydrocarbon Halogenated	F	N	F	N	F	N	F
Ketones	N	N	G	G	G	G	N
Oxidizing agents	F	N	F	F	N	F	F

E=Excellent, G=Good, F=Fair, N=Not recommended, U=Unknown

Some window materials may not be suitable for analyzing sulfur in diesel fuel, gasoline and other petroleum products containing aromatic hydrocarbons. ASTM D-6445-99 (Reapproved 2004) e1: "Samples of high aromatic content may dissolve polyester and polycarbonate films. In these cases, other materials besides these films may be used for X-ray windows, provided that they do not contain any elemental impurities. An optional window material is polyimide film. While polyimide film absorbs sulfur x-rays more than other films, it may be a preferred window material as it is much more resistant to chemical attack by aromatics and exhibits higher mechanical strength." ASTM D 4294-08a: "Any film that resists attack by the sample, is free of sulfur, and is sufficiently X-ray transparent can be used. Film types can include polyester, polypropylene, polycarbonate, and polyimide. However, samples of high aromatic content can dissolve polypropylene, polycarbonate and polyester."

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