MATERIAL PROBLEM SOLVING

A number of synthetic materials are difficult to differentiate. Below are listed some material descriptions which may help you identify your material.

Polyester and Polypropylene

These materials are very similar and can be very difficult to tell apart. Both are very strong and difficult to tear without notching them with a sharp edge. Polyester has a very hard, glass-like surface, and is rigid. Polypropylene has a slightly waxy feel, and will be somewhat more flexible than polyester (when comparing similarly thick samples). Both can be window clear.

Acrylic and Polycarbonate

These materials are very hard, rigid, and have glass-like surfaces like polyester. Clear polycarbonate has a dark grayish color along its edges. If they are colored, acrylic will have brighter coloring, otherwise they are difficult to tell apart.

Vinyl

Vinyl can be very hard to very soft, depending on the plasticizer, but never glass-like hard surfaces. It is always easy to scratch. Flexible vinyl will be difficult to tear because it stretches before tearing, but when torn it will have rippled edges. Semi-rigid vinyl tears easily and leaves jagged edges, like broken glass. Vinyl absorbs UV light (especially from fluorescent lights), then radiates it back in the violet wavelength.

Polyethylene

Polyethylene is usually soft, waxy to the touch, stretches easily, and never very rigid. It will be difficult to tear because it stretches before tearing. It can be scratched with fingernails.

Acetate and Polystyrene

These materials are quite similar to the touch. Both are rigid and will tear very easily. Polystyrene will have a harder, glass like surface, plus it will sound like “tin foil” when shaken in the air. This is a very distinctive sound that only polystyrene and metal foils make.

Identification Testing

Soak a clean piece of the substrate with acetone. Put a small piece of the substrate in the bottom of a clear glass jar, and pour in just enough acetone to cover it. Watch for an immediate reaction. One of the following reactions will give you an indication of what the material might be. Other tests (infrared scans) may be required for an absolute or positive identification. But with some experience, this will give you a fast answer:

1. Acetate completely dissolves and disappears.
2. Polycarbonate (i.e. Lexan) turns whitish and softens along edges only. Otherwise, no change.
3. Polyethylene will curl slightly, especially at edges, but mostly unchanged.
4. Polystyrene melts, turns whitish, and forms a soft, rubbery glob.
5. Vinyl will swell and curl up, becomes very rubbery.
6. Polyester, polypropylene, and acrylic are all unaffected by acetone.

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