



Museum Textile Services

Modern Materials in Textile and Costume Collections

Today, in museum and private collections, there are an increasing number of artifacts that date from the early 20th to very recently. Many of these artifacts contain modern materials (i.e. man-made paints and plastics, semi-synthetic and synthetic textile fibers, digital media) that can deteriorate rapidly due to their manufacturing and proximity to/mixture with other materials. The inherent vices in these materials can be exacerbated by inappropriate storage and display conditions. This handout aims to provide information about identification of modern materials commonly encountered in textile and costume collections and recommendations for storage of these materials.

Historic Materials found in Museum Collections

Material	Common/Tradename	Commercial Production	Historic Use
Cellulose nitrate	Celluloid, Xylonite	1870	Imitation tortoiseshell, ivory, horn – handles, combs, buttons, stays, buckles, sequins
Casein	Lactoid, Erinoid, Galalith	1899	Imitation bone – buttons, buckles, swirling patterns
Cellulose diacetate	Safety film, acetate, Rhodoid	1908	Imitation horn, tortoiseshell, mother of pearl, shell – handles, combs, button, buckles, sequins
Phenol formaldehyde	Bakelite	1909	Buttons, buckles
Regenerated cellulose	Rayon, Viscose Rayon	1910	Textile fiber – clothing
Cellulose triacetate	Acetate (textile fiber)	1919	Imitation silk
Poly (vinyl chloride)	PVC	1927	Imitation leather – dolls, tape, trimmings, belts, waterproof fabric
Urea formaldehyde	Bandalasta, Sarab, Lastalonga	1929	Imitation marble, horn, and amber – buttons, buckles, jewelry
Poly(methyl methacrylate)	Perspex, Lucite, acrylic, Plexiglas	1931	Imitation glass – buttons, beads, buckles, jewelry
Polyamide	Nylon	1938	Textile fiber, strings
Polyethylene	Polythene, Tyvek	1941	Sheet, film, fibers, covers
Polyethylene terephthalate	Terylene, polyester	1942	Film, textile fibers – cotton-, silk-, and wool-like
Polyurethane	Neoprene, Spandex, Lycra	1943	Imitation leather, rubber, elastic, foam – shoe soles, padding, packing/stuffing
Polyacrylonitrile	Acrylic, Orlon, Modacrylic	1950s	Textile fiber – wool-like, sweaters, scarves, hats, upholstery, faux fur
Polypropylene	Polypro, Olefin	1960	Textile fibers – undergarments (thermals)

Identification of Modern Materials:

Modern materials can be identified using non-destructive and destructive means. The simplest non-destructive techniques are to use the appearance and odor of the artifact and its parts to identify its/their composition. Examine the material's look, feel, surface, weight, pattern, style, sound when gently tapped, and smell when rubbed. However, odor given off by modern materials can be subjective (see Assessing Modern Materials handout). FTIR is a non-destructive analytical technique that has been commonly used to identify the polymers in modern materials. Other analytical techniques that can be used are GC-MS, XRF, SEM-EDX, and FT-Raman.

Handling Modern Materials

Some of the degradation products produced by modern materials can be harmful or an irritant. Therefore, please follow safety guidelines to protect yourself and others:

- Wear gloves (nitrile)
- Wash hands after handling (even if wearing gloves)
- Sniff odors cautiously (especially if artifact has been stored wrapped, boxed, or in a bag)
- Do not taste residues from an artifact to determine if they are acidic

Storage Conditions

Due to the risks to museum collections from modern materials used in fabrics and clothing accessories, you should consider storing them separately from other textile materials when possible.

- Some plastics are sensitive to water (i.e. polyurethane foam, polyester) so storing in conditions with low relative humidity (RH) of 30% is recommended. Low RH is best for a wide range of modern materials; however, casein should be stored in a higher RH (50-60%).
- Storage of plastics at low temperatures can slow down the rate of deterioration, however this can be potentially hazardous for composite materials. Care should be taken to make sure water does not condensate on the plastics.
- The degradation of modern materials can be slowed by placing absorbents (i.e. activated carbon, silica gel, zeolites) in their storage container.
- If a textile or costume accessory is sticky, it can be stored wrapped in silicone-release paper or Tyvek®.

Additional Information

American Institute for Conservation (AIC):
<https://www.culturalheritage.org/>

The Australian Institute for the Conservation of Cultural Material (AICCM):
<https://aiccm.org.au/things-we- conserve/modern-materials>

The Institute of Conservation (Icon) Modern Materials Network:
<https://icon.org.uk/groups/modern-materials-network>

International Council of Museums Committee for Conservation (ICOM-CC) Modern Materials and Contemporary Art working group:
<http://www.icom-cc.org/32/working-groups/modern-materials-and-contemporary-art/>

Quye, Anita. *Plastics: Collecting and Conserving*. Edinburgh: National Museum of Scotland (NMS), 1999.

Shashoua, Yvonne. *Conservation of Plastics: Materials Science, Degradation and Preservation*. Boston: Elsevier Ltd., 2008.