Many of the materials available for storing or displaying objects can seriously damage an artefact because of their inherent properties. Some may cause physical damage because their surface is too rough, or because they expand and contract at a different rate to the objects. Others may release chemicals as they age which react with the objects.

Similarly, the objects can cause damage: for example rubber objects such as gas masks give off sulphur compounds as they degrade, accelerating the corrosion of silver and brass objects stored or displayed nearby.

### Choosing Materials

The following table shows what storage and display materials should be avoided and what can be substituted with the reasons for the choice in each case. Remember that these materials can equally be found in museum objects and the substitute list can act as a guide for the display and storage of these items too.

<table>
<thead>
<tr>
<th>Materials to avoid</th>
<th>Acceptable substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FABRICS</strong></td>
<td></td>
</tr>
<tr>
<td>Wool, including carpets, felt and other fabrics containing it.</td>
<td>Undyed unbleached cotton, that has been thoroughly washed with no soap before use to remove any dressings. Other fabrics from plant fibres such as linen or jute or synthetics such as polyester can be used, but may have a higher lignin content or more abrasive fibres which make them less desirable than cotton for close contact with objects. Insects like to eat natural fibres but synthetics can give problems with static, which attracts dust and dirt, and can degrade to give off harmful vapours.</td>
</tr>
<tr>
<td>Wool (and other animal hairs) gives off sulphur compounds that tarnish metals, including silver, copper, metal embroidery threads, sequins and silver photographic images. They can also cause fading in feathers and other ethnographic materials. Insects particularly like to eat wool.</td>
<td>Coloured fabrics should be tested to see if they give off harmful vapours and if they are colourfast. Conservation grade dyes can be used which do not leave harmful chemicals in the fabric.</td>
</tr>
<tr>
<td>Store objects which have wool or animal hair in recommended materials and have a regular programme of checking for pests. Do not display them in an enclosed space with the types of objects mentioned above. Ventilation can help to prevent the build-up of harmful vapours.</td>
<td>Loose dust-covers can be made from washed, unbleached cotton calico or a non-woven polyester fabric such as Tyvek.</td>
</tr>
<tr>
<td><strong>THREADS</strong></td>
<td></td>
</tr>
<tr>
<td>Nylon thread and fishing line should not be used to suspend objects or attach fabrics to backing as they concentrate pressure on a small area of the object and can cause indentations and damage. They are hard to knot securely. When aged, they can suddenly fail and snap.</td>
<td>Use polyester or cotton thread to sew modern fabrics. Objects should not be suspended on a small surface area such as threads, hooks or wires.</td>
</tr>
<tr>
<td>Materials to avoid</td>
<td>Acceptable substitutes</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><strong>PADDING</strong></td>
<td></td>
</tr>
<tr>
<td>Cotton Wool</td>
<td>Polyester wadding</td>
</tr>
<tr>
<td>should not be used to pad objects. Fibres catch on projections and can be difficult to remove and the cotton wool may contain substances which deteriorate and may harm the objects.</td>
<td>can be used to give cushioned support, however ensure it is covered with washed, unbleached cotton calico to prevent fibres catching on the surface of objects and small objects being lost within it.</td>
</tr>
<tr>
<td>Polythene foams such as Plastazote and Ethafoam</td>
<td>are inert and non-abrasive.</td>
</tr>
<tr>
<td>Acid-free tissue can be gently crumpled into shapes to pad objects.</td>
<td></td>
</tr>
<tr>
<td><strong>WOOD</strong></td>
<td></td>
</tr>
<tr>
<td>Unseasoned woods</td>
<td>It may be necessary to use wood, but it should always be sealed. Barrier foil is the best method. This is a gas impermeable metal foil sealed between layers of inert plastic film, such as PP004 (Moistop) and Marvelseal 360. Seal the edges with aluminium tape. The foil must not be punctured, as this will allow gases through so do not pin or staple through it.</td>
</tr>
<tr>
<td>should not be used: they still contain sap and moisture and will change shape dramatically.</td>
<td>An alternative is an acrylic varnish which does not give off harmful vapours. Dacrylate, Selabond RJ119 and Cuprinol Enhance are suitable. Use at least 3 coats and allow them to dry thoroughly between applications</td>
</tr>
<tr>
<td>Many hardwoods and softwoods give off formic and acetic acid vapours as they age, which can cause corrosion in metals, interact with salts in stone and pottery and accelerate the deterioration of organic materials. Unsealed wood should not be used.</td>
<td>A solid acrylic resin such as Perspex can be used to make mounts or supports instead of wood.</td>
</tr>
<tr>
<td>Don’t forget, wood products such as paper and card are made from pulp containing lignin and other products which deteriorate, giving off acidic vapours.</td>
<td></td>
</tr>
<tr>
<td><strong>COATING</strong></td>
<td>Use archival quality, undyed and unbleached materials. Materials can be tested for chemical compatibility.</td>
</tr>
<tr>
<td>Fire retardant or waterproof coatings may contain materials which can cause fading and other damage to organic objects.</td>
<td></td>
</tr>
<tr>
<td><strong>PAPER AND BOARD</strong></td>
<td></td>
</tr>
<tr>
<td>Ordinary paper, tissue paper and card, gummed paper tape and Foamcore (often used for dry mounting labels) and glassine photo envelopes have the same problems as wood becoming acidic over time. This can cause organic objects that are in contact with them to become discoloured and deteriorate and accelerate corrosion of metals and devitrification of glass.</td>
<td>Use acid-free paper, tissue paper and card from an archival/museum supplier. Foamex board can be used for display panels. Acid-free paper framing tape is available. Remember that these will still deteriorate as they age.</td>
</tr>
<tr>
<td>Inert polyester film such as Secol or Melinex can be used to make folders and envelopes to store paper objects or photos in. They are transparent, which is very useful if the objects need to be handled.</td>
<td></td>
</tr>
</tbody>
</table>
### Materials to avoid

<table>
<thead>
<tr>
<th>BOARDS</th>
<th>Acceptable substitutes</th>
</tr>
</thead>
</table>
| **Composite Boards** including plywood, chipboard, particleboard and hardboard are made with wood particles bonded with resin-based adhesives. These give off harmful phenol or urea formaldehyde which form organic acids; for example formaldehyde reacts with other materials to form formic acid, which is very destructive. Phenols and formaldehyde are also a health hazard for people. | **Zero Grade MDF**  
**Medite (MDF without a binder)** and **Sundela K Quality** (not A grade)  
**Marine Plywood**  
These have lower levels of formaldehyde in their make up. They should still be treated with barrier foil or a suitable acrylic varnish as described for wood, above, as they are still a source of organic acids. |
| **Acrylic** such as **Perspex**, or polythene sheets, such as **Correx**, are stable and inert. | **Aluminium** and **Steel** that have been coated with stove enamel or an epoxy-based coating can be used. These coatings need to be well cured as they may give off harmful vapours while they dry. |
| **Aluminium** and **Steel** that have been coated with stove enamel or an epoxy-based coating can be used. These coatings need to be well cured as they may give off harmful vapours while they dry. |  |
| **ATTACHMENTS**  
Unsheathed metal pins, sticky tape, masking tape, Blu tac, Velcro and self-adhesive labels. These will all lead to the deterioration of the objects. Unsheathed metal pins can cause accelerated corrosion if they touch metal objects, or stain items as they corrode. Any sticky substance or adhesive applied directly to an object can leave staining which may be impossible to remove and can cause chemical deterioration. Pressure-sensitive adhesives will fail, and labels will be lost. | **Use mounts made from safe tested materials.**  
Cover metal pins with **Polyethylene sheathing** (catheter tubing).  
Labels made from spun-bonded polyester (**Tyvek**) can be tied on using **unbleached cotton tape or cord**.  
Accession numbers should be written in ink onto an area protected with a suitable acrylic varnish such as **Paraloid B72** dissolved in acetone, applied on a discreet part of an object. |
| **ADHESIVES AND SEALANTS**  
**Rubber and rubber adhesives** (including urethane foam backed carpets, vinyl tiles and the flooring adhesives used to bond them down) give off sulphur, which means that it causes deterioration as we have already noted for wool. Rubber is degraded by light exposure. Through time it becomes brittle and disintegrates. This makes it unsuitable for a case sealant. Ensure rubber artefacts have plenty of ventilation around them, and their packing, to allow off-gassing. Ensure that rubber based objects are kept separated from other objects, particularly those mentioned above. Most **silicone rubber sealants** give off acetic acid. Self-adhesive seals tend to slip and peel away as well as giving off harmful vapours. | **Acrylic adhesives and varnishes** that have been tested for suitability.  
Physical case sealants include **Nylon Brush** (used like draught excluders) and cotton velvet ribbon.  
**Inert polythene Plastazote** foam can be cut into strips and attached with acid-free double-sided polyester tape.  
**Polytetrafluoroethylene (PTFE) Tape.** This tape is stretched around the edge of glass before it is inserted into place. The tape relaxes and fills the gap between the glass and the frame so holding it in place.  
**Silicone Silastic 7091 from ISL** (unlike other silicone based sealants it produces ethanol). |
# Materials to avoid

**PLASTICS**

PVC plastic deteriorates giving off hydrochloric acid. The plasticisers used in PVC (polyvinyl chloride) can affect photographic materials such as slides, prints and negatives as well as objects made from rubber and other modern plastics.

PVC and Polystyrene sheet go yellow as they age making them unsuitable for glazing.

<table>
<thead>
<tr>
<th>Acceptable substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archival Polyester sleeves such as Secol and Melinex.</td>
</tr>
<tr>
<td>Polyethylene (polythene) is chemically inert and very stable and can be used in many ways as sheets or as a spun bonded fibre products (e.g. Tyvek) which are useful for labels and dust covers for costume and upholstered furniture. Be careful of moisture condensing on polythene sheet and use buffering materials such as acid-free tissue between the object and the polythene sheeting.</td>
</tr>
<tr>
<td>For glazing use Glass or acrylic sheet. Glass can be heavy and expensive to buy in large sheets. Acrylic sheet such as Perspex is cheaper but it can warp. Scratch-resistant and low static grades (which do not attract so much dust) are available. Ultra-violet filtering grades are available.</td>
</tr>
</tbody>
</table>

# ADHESIVES FOR DISPLAY MATERIALS

Polyvinyl acetate emulsion (PVA), Urea Formaldehyde adhesives and Polyurethane varnishes all give off organic acids including acetic acid. These attack many materials, especially lead.

<table>
<thead>
<tr>
<th>Acrylic adhesives.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot melt glues (ethylene/vinyl acetate copolymer types)</td>
</tr>
<tr>
<td>Evode Epoxy Resin</td>
</tr>
<tr>
<td>HMG Paraloid B72 Acrylic adhesive</td>
</tr>
<tr>
<td>HMG Cellulose Nitrate adhesive or UHU Clear</td>
</tr>
<tr>
<td>Sellotape Double-sided Tape</td>
</tr>
<tr>
<td>Stitch Velcro</td>
</tr>
<tr>
<td>Staples (phosphor bronze type)</td>
</tr>
</tbody>
</table>

*NEVER USE THESE ON OBJECTS*

# Materials testing facilities

Contact your local conservator about finding a conservation service/unit which can provide a material testing facility to help you select materials that will not harm the artefacts. The most important element for carrying out the testing is planning in the time. It is likely to take 6 weeks to test the products once they have been received by the Unit.

To find a registered conservator, see the website for the Institute of Conservators: www.icon.org.uk
Suppliers List

Acid-Free Tissue and Acid-Free Box Board/pH Strips/ Moistop Film
Conservation By Design Ltd
Timecare Works
5 Singer Way
Woburn Road Industrial Estate
Kempston
Bedford MK42 7AW

Catheter Tubing (polythene)
Scientific Laboratory Supplies Ltd
Sales Office
Wilford Industrial Estate
Ruddington Lane
Wilford
Nottingham NG11 7EP
Tel: 0115 982 1111

Correx
Plasboard Plastics Ltd
Unit 8
Broomfield Industrial Estate
Montrose
Angus DD10 8SY
Tel: 01674 676 006

Evode Epoxy Resin
SBA Ltd
National Distribution Centre
Freemans Cannon Road
Leicester LE2 7SQ
Tel: 0116 254 1262
* Minimum order applies

Cuprinol Enhance
DIY stores and Builders Merchants

Dacrylate acrylic glaze
Clifton Paints
92-100 North Street
Bedminster
Bristol BS3 1HF
Tel: 0117 966 0321

LF and ZF MDF
Local Builders Merchants and DIY shops

Medite MDF
Weyerhaeuser Products Ltd
10th Floor Maitland House
Warrior Square
Southend on Sea
Essex SS1 2JY
Tel: 01702 619044

Melinex polyester products (Secol)
Secol Ltd
Howlet Way
Thetford
Norfolk IP24 1HZ
Tel: 01842 752341

Marvelseal 360/ Tyvek
Preservation Equipment
Vinces Road
Diss
Norfolk IP24 1HZ
Tel: 01370 667 400

Moistop (PP004)
Protective Packaging Ltd
Dane Road Industrial Estate
Dane Road
Sale
Cheshire M33 1BH
Tel: 0161 976 2006

Plastazote
Beldam Plasmar
Neechells Lane
Wednesfield
Wolverhampton WV11 3QG
Tel: 01902 307 111

PTFE Tape
Builders Merchants

Silicone Silastic 7091 (for small amounts)/ HMG Paraloid B72 and Cellulose Nitrate adhesives
Conservation Resources UK Ltd
Unit 2
Ashville Way
Off Watlington Road
Cowley
Oxfordshire OX4 6TU
Tel: 01865 747 755

Selabond RJ119
Trimite Ltd
Arundel Road
Uxbridge
Middlesex UB8 2SD
Tel: 0189 525 1234

Unbleached Calico and Polyester Wadding
Local Haberdashers

Unbleached Calico and Black Cotton Drill
Whaleys (Bradford) LTD
Harris Court
Great Horton
Bradford
West Yorkshire BD7 4EQ
Tel: 01274 576 718