

## Hazardous materials in museum collections

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The following is a list of the sorts of materials in general museum collections that may present a danger, either to museum workers and visitors, or to other objects in the collection.

If you are concerned about such materials in your collection, contact a trained conservator through the Australian Institute for the Conservation of Cultural Materials (AICCM) [external link](#) or contact M&G NSW for a referral.

It may also be necessary to contact outside authorities that can give advice on particular kinds of materials. Refer to our related resources for the Fact Sheet on Hazardous material assistance and advice organisations.

### **Aerosol cans**

The contents of aerosol cans are under pressure they have the potential to explode. They present a hazard to themselves, to other objects in the collection and to people. Heat is a critical factor in this so it is advisable to keep the can cool while seeking advice.

### **Asbestos**

The different forms of this fibrous mineral can cause cancers if dust containing the fibres is inhaled or ingested. Asbestos is found in building materials, such as asbestos-cement ('fibro'), fireproofing and insulating boards, cement, shingles, pipe lagging and tiles. It also occurs in many other products where its fireproof and insulating qualities are utilised. These include fireproof clothing, curtains, blankets and ironing board covers; appliances such as hair driers, hair wavers, electric jugs, toasters, stoves and clothes driers. Asbestos has also been used in vehicle brake pads, linings, clutch facings and gaskets, and around the engines of working models. In some instances treatment of objects containing asbestos involves sealing the fibres rather than disturbing them by trying to remove them.

### **Batteries**

Old electrical batteries and cells may leak acid and corrosive salts and release corrosive vapours.

### **Corrosive materials**

Some chemicals, including caustic and acidic materials, pose a hazard, not only to humans, but to their own packaging and to other objects in the collection if they should leak or are not properly packaged.

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## Film

Old photographic film is unstable and dangerous. Cellulose nitrate stock (nitrocellulose) was widely used for still photography, X-ray film and movies until the early 1950s. It is highly flammable and may combust spontaneously, releasing toxic gases. As it deteriorates it produces substances damaging to people and the surroundings. Cellulose acetate stock produces acetic acid (vinegar) that can attack other objects in the collection.

## Firearms and ammunition

Stringent regulations cover the keeping of firearms in museums. Check with your local police station. Ammunition that is live or suspected of being live is, of course, a hazard. Refer to the Australian War Memorial or to the Department of Defence for advice.

## Fire extinguishers

The contents of old fire extinguishers are toxic and potentially damaging to other materials. Being under pressure, they present the potential to cause injury and damage if accidentally discharged.

## Flammable and explosive materials

These can include munitions, matches, fireworks, fuels, solvents, cleaning agents, gases, propellants, hydrogen peroxide, ether and picric acid.

## Foodstuffs

Items of food may attract insects, or they may leak and cause damage to their own packaging and to other objects. Old unopened cans of food may be contaminated with bacteria that will cause the can to swell and explode, spreading botulism and damaging anything and anyone nearby.

## Formaldehyde

This substance off-gases from wood adhesives and resins. Composite boards are often used in the construction of museum exhibition furniture and showcases, and in storage cupboards and shelves. These composite boards, including plywood, Masonite, particleboard and fibreboard, emit formaldehyde fumes that can build up in enclosed areas. Formaldehyde is a health hazard and is also flammable. See also 'Natural history and anatomical specimens'.

## Household products

Housekeeping products that are toxic include fabric dry cleaning fluid containing carbon tetrachloride, insecticides, moth crystals and rodent poisons. See also 'Toxic materials'.

## Infective material

Soiled medical implements may carry traces of human tissue or body fluids. Art works and ethnographic objects may be made from human blood, hair, bone, or urine. Many other kinds of ordinary museum objects can carry traces of human usage, such as skin flakes, perspiration, saliva, blood, vomit, faeces or urine. Any of these remnants of human material may contain pathogens and so there is a possibility, although small, of contracting a disease from them. There is also a possibility of being infected by anthrax through handling animal products, or by tetanus if scratched or punctured by a sharp or pointed object.

## Insecticides, fumigants and preservatives

Many museum objects will have been treated in the past with preservatives, or with substances that prevent mould or pest infestation. Pest treatments once used in museums include ethylene oxide, arsenic, dichlorvos, tobacco, camphor, strychnine, mercuric chloride, naphthalene, paradichlorobenzene (PDB), DDT, methyl bromide, cyanide and compounds of cyanide. However there is often no record of what treatments have been employed. Traces of these substances may still permeate the objects or be caught in air pockets. Many, if not most of them are injurious to humans. See also 'Toxic materials'.

## Laboratory and other chemicals

Scientific or technical collections may include containers of chemicals. Sometimes the dangerous properties of these chemicals would not have been realised at the time of their acquisition. Some chemicals may be toxic, corrosive, flammable, or explosive (or all of these). Unidentified chemicals should be treated as being potentially toxic. Some chemicals present a potential hazard if stored near incompatible chemicals.

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## Lead

The metal lead and all its compounds are cumulative poisons. Lead has been used until quite recently in some cements, almost all outdoor paints before 1980, other kinds of pigment, and ceramic glazes. Items made of lead can include lead toys, plumbing and roofing materials, bullets, shot, printing type, weights and seals, sculptures, and X-ray shielding equipment including aprons, gloves and screens. As lead corrodes it produces a powdery substance that is easily airborne and likely to cause lead poisoning by inhalation. Similarly paints and glazes may be inhaled if they deteriorate and become flaky.

## Medical and pharmaceutical items

In medical collections, potentially hazardous materials include: sharp instruments; equipment that might be contaminated with human tissue; medications and drugs that are dangerous or prohibited; substances (like picric acid and ether) that are flammable or explosive; radioactive apparatus; and bottled anatomical specimens. See [How to: identify medical objects in museum collections](#)

## Mineral collections

Many types of minerals are poisonous or cancer causing. When disturbed some produce fibres that can be ingested or inhaled. Some are radioactive. Examples of hazards in mineral collections include specimens containing arsenic, asbestos, mercury and uranium, and fossils that emit radon.

## Mould

Mould that has been allowed to grow on collections may produce spores that are injurious to health. Some types can even be fatal if inhaled. Collections that have been through a water-induced disaster and collections that are stored in damp conditions are particularly susceptible to mould growth. Dust on collections exacerbates the problem because it grabs moisture, which in turn allows the growth of mould.

## Natural history and anatomical specimens

The fluids in which many bottled natural history and anatomical specimens are preserved are now considered to be dangerous, either because they are toxic or flammable or both. These include formaldehyde (formalin) and alcohol. Other kinds of natural history specimens and mounts are likely to have been treated with preservatives that are now recognised as being toxic including, for example, arsenic. Very often there is no record of what the specimens have been treated with, or what fluid they are preserved in.

## Plant materials

Poisonous seeds and other plant material may occur in such objects as: articles of adornment in ethnographic collections; seed jewellery, placemats and other tourist items; rosaries, dolls, rattles and maracas; and Victorian and Edwardian jewellery and crafts.

## Plastics

Celluloid is cellulose nitrate (or nitrocellulose), the same compound that some old photographic film stock is made from. It was used for making a huge range of household items and toys from around 1870 to 1920, many of them ivory, mother-of-pearl and tortoiseshell look-alikes. These objects are all deteriorating and emit gases that are harmful to people and objects. PVC (polyvinyl chloride) plastic, while not as dangerous, breaks down and produces hydrochloric acid. Many kinds of flexible and rigid plastic products are made of PVC. There are also other kinds of plastics that are deteriorating and producing harmful materials.

## Physically injurious objects

Items that are heavy, that are unusually shaped, or that have protuberances, points or sharp edges should all be considered hazardous. They have the potential to cause injury to people or to damage other objects if not stored properly and handled carefully.

## Radioactive materials

As well as medical items (like therapeutic radium sources and radioactive quack remedies), sources of radioactivity in museum collections can include radium in luminous paints, used for example on clock and watch faces and instrument dials, particularly aircraft dials, and on light switches, doorknobs, religious statuary and chamber pot lids. These are generally safe unless the paint is disturbed, in which case it may flake off as powder that can be ingested or inhaled. Radioactive substances can also be found in mineral collections, electronic equipment including radio valves, glazing, enamelling, photographic processing materials, alloyed steels, radiation shielding, and many kinds of aircraft component.

## Stains

Some objects are capable of staining other material in the collection if they should leak. These include inks, dyes, and laundry 'blue bags'.

## Toxic materials

The materials that many objects are made from may contain toxic substances in their manufacture, including carcinogens (causing cancer) and teratogens (causing foetal abnormalities). Amongst these toxic substances are copper salts; asbestos(see above); chemicals used in tanning; lead, either as solid items or in the ingredients of other items (see above); mercury in thermometers and barometers and on mirror backings; mercury used as a preservative, fungicide or pesticide in, for example, artists' canvases, wooden objects, and anatomical specimens; compounds of mercury found in dyes and pigments, especially red colours, and in house paints manufactured as recently as the 1980s; arsenic in insecticides, herbicides and defoliants; arsenic used as a preservative in taxidermy specimens, and also found in mummies, ethnographic objects like baskets or items with feathers or fur, and in textiles and clothing; arsenic salts in green dyes and pigments in clothing, fabrics, ceramics and wallpapers, especially from the Victorian period; cyanide in inks for printing and wallpaper; residues of cyanide solutions used to clean precious metals; phosphorous in match heads, munitions, fireworks and explosives.



### You might also like ...

#### **Hazardous materials–Written reference list, M&G NSW**

[mgnsw.org.au/sector/resources/online-resources/risk-management/hazardous-materialswritten-reference-list/](http://mgnsw.org.au/sector/resources/online-resources/risk-management/hazardous-materialswritten-reference-list/)

#### **Hazardous material assistance and advice organisations, M&G NSW**

[mgnsw.org.au/sector/resources/online-resources/risk-management/hazardous-material-assistance-and-advice-organisations/](http://mgnsw.org.au/sector/resources/online-resources/risk-management/hazardous-material-assistance-and-advice-organisations/)

#### **Hazardous materials in medical collections, M&GNSW**

[mgnsw.org.au/sector/resources/online-resources/collection-care/identify-medical-objects-museum-collections/](http://mgnsw.org.au/sector/resources/online-resources/collection-care/identify-medical-objects-museum-collections/)