

# Care and conservation of geological specimens

This leaflet provides information about the care of geological collections and how to prevent, notice and manage any problems that may arise.

Geological collections include:

- **Petrology collections:** rocks and building stones
- **Mineralogy collections:** minerals, gems, meteorites, carbonaceous minerals such as petroleum and coal variants
- **Palaeontology collections:** fossils; from vertebrates to microfossils
- **Microscope slides:** thin sections, micro fossils, etc.

## Setting the right environment

Storing geological specimens in the wrong environment may give rise to damaging problems. Not all types of geological material need the same conditions.

A dry environment can affect specimens. For example deep blue copper sulphate crystals will lose water and crumble to a pale blue powder in relative humidity (RH) below 35%. Shale samples can dry out and become brittle in low RH.

Sub-fossil bone can swell and contract with variations in RH. Where fluctuations are too rapid or too severe (greater than 10% in an hour) specimens can split and break apart.

Damp can cause a number of problems:

- In RH above 60% iron pyrite will react with atmospheric water to form hydrated iron sulphate and sulphur trioxide. This can form a weak sulphuric acid. Other sulphide mineral species can also deteriorate via similar reactions at high relative humidities.
- Pyrite decay can occur in rocks, fossils and minerals, with the specimen literally crumbling to dust.
- Chloride-based salts in minerals can combine with iron pyrite, forming hygroscopic (moisture absorbing) ferric chloride which appears as brown droplets on specimens; it is also acidic and can cause corrosion.
- In RH above 65% mould growth will occur.

## Care of Collections

### The Store Room

All collections should be stored in environmentally controlled space appropriate to the type of material.

To minimise deterioration, keep specimens out of direct sunlight and limit other light sources. Store rooms which hold a number of different types of collections should be kept at a relative humidity (RH) level between 45% and 60% RH. Temperature levels should be as stable as possible, ideally at a constant 16°C to 18°C, but certainly between 10°C and 22°C.

Individual collections may require specialist environments to prevent damage:

- Sub-fossil specimens should not be stored in conditions below 45% RH.
- Pyrite-containing specimens should not be stored in conditions above 60% RH and preferably should be stored in conditions of 45% RH or lower.

Pests may cause damage to associated labels and organic based glues used for repairs on specimens. Pests can be monitored using insect traps (such as the sticky trap), which can be checked quarterly.

### Storage

Specimens can be stored in clear polystyrene lidded boxes, or low-acid card trays, nested in acid free tissue or Plastazote cut outs. Clear lidded boxes provide protection from dust and allow the specimen to be seen, reducing the need for handling it.

Light will irreversibly damage some mineral species. The arsenic sulphide group of minerals are the most susceptible to light damage (including realgar which reacts irreversibly with light to form a powdery orange breakdown product para-realgar). Other minerals which are susceptible to light damage include purple amethyst and green fluorites, which will fade in strong light. Susceptible mineral species should be stored in light-proof containers.

### Hazardous and Toxic Specimens

Mineral collections may contain hazardous and toxic specimens. In many cases they may not be identified on the specimen. Once identified, appropriate labels should be added to specimen boxes, drawers and cupboards.

Hazardous specimens:

- **Radioactive Minerals:** a mineral collection should be checked using a Geiger Counter to identify radioactive specimens. If the collection holds radioactive specimens, you will need to contact a Radiation Protection Advisor. If you are unsure, please use the contacts provided. Always wear gloves and a dust mask when handling specimens (radon decay products are attracted to dust



Pyrite decay on some small ammonite specimens

**Find a conservator by using the conservation register**

The Register is free to use; it provides detailed information on conservation-restoration practices based in the UK and Ireland including contact details, referenced examples of previous work and the qualifications of members of staff. It is searchable by specialist skill and geographical location and each business has been required to meet rigorous criteria which include professional accreditation of the lead conservator of the business; the information is regularly updated..

[www.conservationregister.com](http://www.conservationregister.com)



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which can be inhaled) and wash hands afterwards. Minimise the time you spend holding radioactive specimens.

- **Asbestiform Minerals:** can be identified by their fibrous nature. Wherever possible, minimise any handling of these specimens. If you need to move a specimen, handle very carefully, with gloves, a dust mask, and disposable apron. Any repacking of specimens should be carried out by asbestos experts. If you are unsure, please use the contacts provided. (Local councils usually employ specialist asbestos officers, who are qualified and trained to check and monitor asbestos fibre levels in the air.)

Common toxic specimens:

- Arsenic, antimony (including stibnite), and some lead minerals (eg. cerrusite) should be handled with gloves and stored in lidded clear polystyrene boxes, lined with Plastazote. (The lead mineral Galena is not toxic because it is insoluble.)
- Mercury: handle with gloves, and wear an activated charcoal face mask if handling. Store in lidded clear polystyrene boxes, but only open in a fume cupboard. This will reduce the build up of mercury vapour, and the lipped box will hold any liquid mercury that has seeped from the specimen.

### Safe Handling

Mineral specimens can be highly brittle and some have needle-sharp crystals. It is recommended to wear disposable nitrile gloves when handling any specimen. Boxes containing heavy rock specimens should always be clearly labelled.

### Basic Remedial Conservation

Any treatment carried out should be fully documented to provide a record for future conservation and/or research. If you are unsure about a treatment, contact a conservator or curator for advice.

- **Dust:** puffers can be gently blown onto the specimens to remove dust. Hard brushing or blasts of compressed air can lift layers of fossil shell, dislodge and tear labels or break fine crystals. Dusting should be carried out wearing gloves and a dust mask and using dust extraction or a fume cupboard.
- **Pyrite decay:** storing specimens below 45% RH will slow down the decay. Where specimens have been damaged (evident by white, yellow or green crystalline efflorescence, a 'rotten egg' smell and the occasional collapse of specimens) manual removal of the decay products combined with chemical treatment by a professionally qualified conservator is possible. Reconstruction of the original specimen may not be possible.
- **Microclimates:** controlled sealed environments can be created to be oxygen free (to stop decay reactions) or to have a specific RH. Microclimates have been commonly used to create dry environments for specimens that have suffered from pyrite decay. Boxes made by Stuart Plastics have been shown to have the best seal. The specimen can be placed in the Stuart box and packed in a Plastazote cut out. A small pierced zip-lock bag of de-hydrated silica gel is put inside with the specimen (the silica gel is dried in an oven). The dry silica gel will remove moisture from the environment inside the box. (A sealed environment can be also created by sealing a specimen inside Escal™ film).
- **Microscope slides:** specimens can be mounted in short-term mounting media which can rapidly deteriorate by contracting, darkening or crystallising, thus destroying the specimens. Slides should be checked annually and, if serious deterioration is noticed, a microscope slide conservator should be contacted. Slides can be cleaned of surface dirt using wool swabs or buds dampened with deionised water.

Many of these problems arise from poor storage conditions. Basic remedial conservation can be carried out on affected specimens but the storage will need to be reviewed. Placing specimens back in the same storage will cause the same problems to reoccur.

## Seeking further help

Geological collections include a wide range of different specimens which can have a variety of problems. If you notice something which you are unsure about, please contact a specialist conservator or curator for advice. If you cannot find help locally, contact the Institute of Conservation, the Geological Curators Group or the Natural Sciences Collections Association. Museums, county or regional Museum Development Officers and geological institutions can also provide help and advice on all areas of collection care.

Other natural history leaflets in this series:

Care and conservation of zoological specimens

Care and conservation of botanical specimens

### Useful weblinks:

The Institute of Conservation: [www.icon.org.uk](http://www.icon.org.uk)

The Natural Sciences Collections Association: [www.natsca.info](http://www.natsca.info)

The Geological Curators Group: [www.geocurator.org](http://www.geocurator.org)

Health and Safety Executive: [www.hse.gov.uk](http://www.hse.gov.uk)

Radiation Protection advisors: [www.hse.gov.uk/radiation/rpnews/rpa.htm](http://www.hse.gov.uk/radiation/rpnews/rpa.htm)

Asbestos Advice: [www.hse.gov.uk/asbestos/faq.htm](http://www.hse.gov.uk/asbestos/faq.htm)

### Suppliers:

Escal™: [www.csconserv.co.uk](http://www.csconserv.co.uk)

Plastazote: [www.ramfoam.com](http://www.ramfoam.com)

Conservation packaging and materials can be purchased from:

Conservation by Design [www.conservation-by-design.co.uk](http://www.conservation-by-design.co.uk)

Conservation Resources Ltd:

[www.conservation-resources.co.uk](http://www.conservation-resources.co.uk)

Preservation Equipment: [www.preservationequipment.com](http://www.preservationequipment.com)

This leaflet has been produced in partnership with the Institute of Conservation (Icon) and the Natural Sciences Collections Association (NatSCA).

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NatSCA is a charity registered in England & Wales (No. 1098156). NatSCA represents natural science collections and the staff that work with them. Its aims include advancing best practice within the sector, providing training, acting as an advocate and working with relevant governing bodies.

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