

09:00-10:45 session, 21 September: Chemical agents of deterioration

This session will cover what can be described, broadly, as pollutants, one of the ten agents of deterioration defined in an earlier session. For the purposes of the course, these will be divided into three categories.

1. Particulate pollutants

Particulate pollutants, which comprise dust and other materials that soil cultural heritage objects, are present in the atmosphere inside and outside building as result of natural and anthropogenic processes. The sources of common – and less widespread – types particulate will be explored, including the natural breakdown of building materials, combustion, salts and visitors.

The chemical and physical properties of these particulates will be presented and the effect that these may have on cultural heritage objects will be detailed and illustrated, for example soiling, abrasion, chemical interaction and attracting pests.

The relation between particulates and visitors will be explored and methods of to monitor them will be introduced and compared.

Simple and more complex methods to address the issues of particulate pollution will be the theme for a short group exercise.

2. Outdoor gaseous pollutants

In addition to sources of particulates, the outdoor atmosphere also contains gases that can enter spaces used to house cultural heritage objects and have an adverse effect on them. The types of gases present, their sources and the effect that they may have on different types of object will be presented. The result of human activity on the concentrations of these gases will be presented – looking at urban and

rural situations and the way in which patterns have changed over the last few decades in different parts of the world

Methods to monitor pollutants will be introduced as well as measures to reduce the concentration of those that are most harmful.

3. Indoor gaseous pollutants

Indoor gaseous pollutants are those that are generated within the building used to house objects – in contrast to those that penetrate from the outdoor environment.

The gases that are commonly generated within the building and storage or display cases within it will be introduced and their potential effects on cultural heritage objects will be illustrated. The sources for such pollutants will be considered, including the visitors, the activities conducted within the building and the materials of which the building and display environments are constructed.

The ways in which the concentrations of such pollutants can be monitored will be detailed and the methods available to reduce the concentrations be discussed.

A particular focus will be the materials used to construct storage and display furniture and the techniques by which these are typically tested to ensure that damage from indoor pollutants is minimized.

A brief group exercise will consider the relative merits and issues of using showcases to protect different types of object from chemical agents of deterioration and will serve as a way of drawing together the three strands of the session.

13:00-15:30 session, 22 September: Light and ultraviolet radiation

This session will cover one of the ten agents of deterioration defined in an earlier session by examining the effects of light and ultraviolet radiation on cultural heritage objects. The session will be divided into four sections

1. Light, radiation and colour

The first part of the session will introduce the certain fundamentals of light and colour that help in an understanding of the effects of light on objects, the basic operation of the human vision system and the way in which colour is perceived and measured, all of which will be used later in the session.

- The fundamental physics of light, including definitions of light and ultraviolet radiation
- The way in which visible light is detected by the eye and how this leads to our perceptions and definitions of colour.
- How different factors affect colour vision and perception of colour.
- Methods used to measure colour and changes in colour

2. Damage caused by light

The way in which light interacts with objects will be considered and examples given of the visible effects of light damage to cultural heritage objects.

Different materials within an object have different susceptibilities to damage by light and ultraviolet radiation. Methods of determining and ranking susceptibility will be introduced and current categorizations of light susceptibility presented and compared.

The susceptibility can be related to amount of change or damage in objects over long periods of display at particular levels of light. The visible effect of damage over these periods will be assessed in the context of the perceived acceptability of different levels of change over time; the implications of this for display and storage policies will be considered.

3. Light levels and light control

Having established the damage caused by light, this section considers how much light is needed for visitors to perceive and appreciate objects while minimizing damage – that is balancing conservation with access by visitors.

- The amount of light needed for different types of display or study, and various types of object
- Background to setting of light levels for display
- The effect of the viewer and surroundings on the light levels needed
- Modifying the type of light to reduce damage
- Comparing current guidelines for lighting cultural heritage objects
- Ethical concepts, such as object lifetimes and intergenerational responsibility.

A group exercise will consider the acceptability of changes to objects and the balance between conservation of the objects and meaningful access to them by visitors.

4. Practicalities of lighting

This section will introduce the types of light source available, including daylight and different types of lamp, giving some of the advantages and disadvantages of each, examining both the relative level of damage caused by each type of source and the practicalities of using daylight or electric lights. The energy efficiency and sustainability of different lighting solutions will be compared.

Guidelines for reducing damage through controlling exposure and selective filtration will be introduced, charting the development of current recommendations for light levels and exposure.

Methods of measuring, controlling and monitoring light levels and exposure will be explored and the means by which reductions in light exposure might be achieved through managing the display of objects as part of a lighting policy will be presented.

A group exercise will draw together the session by developing of a short lighting policy and a set of practical guidelines for the storage and use of a small collection being considered for loan.