Preservation Advisory Centre

Photographic material

Preservation Advisory Centre
The British Library
96 Euston Road
London
NW1 2DB

T +44 (0)20 7412 7612
blpac@bl.uk
www.bl.uk/npo

The Preservation Advisory Centre has been awarded the CILIP Seal of Recognition based on an independent review of the content of its training courses and its engagement with the CILIP Body of Professional Knowledge.

Author Susie Clark, ACR, Accredited Photographic Conservator

ISBN 978 0 7123 0909 7

Design The British Library Design Office

Cover Antoine Jean François Claudet, Portrait of William Henry Fox Talbot, early 1840s. Daguerreotype.

First published August 1999
Revised October 2009

Preservation of photographic material

Introduction

Photographs are housed in libraries, archives and museums all over the world. Whilst photographic conservation is a relatively new specialism and treatment options are often limited, it is usually possible to prolong the life of a photograph through good preservation practices in handling, housekeeping and storage. This booklet describes the most common historical photographic processes, outlines the causes of deterioration and provides guidelines on good preservation practice. It is aimed at people working or volunteering in libraries, archives and museums whose responsibilities include photographic collections. Whilst the booklet focuses on monochrome photographs, much of the information is applicable to colour photographs and other imaging materials such as microfilm, x-rays and motion picture film.

What is a photograph?

A photograph is an image produced by the action of light. The light initiates a chemical reaction which leads to a long lasting chemical change in a light-sensitive compound bound to a support. The support is usually made of paper, plastic, glass, or metal, but sometimes leather or cloth. Photographic images are usually continuous in tone, meaning changes in shading between light and dark are gradual and patterns such as regularly spaced dots or grids are not usually seen. Images produced by photomechanical processes for books and newspapers are non-continuous in tone.

History

Photography was officially ‘invented’ in 1839 with the public announcement of Louis Jacques Mandé Daguerre’s daguerreotype process in France and William Henry Fox Talbot’s photogenic drawing process in England. Louis Daguerre’s process relied on a sensitised silver coated copper plate which was exposed in a camera and after processing became a unique positive. W H Fox Talbot’s process produced a silver image on a paper support. W H Fox Talbot, together with Sir John Herschel, very quickly realised the importance of having a negative from which one could make multiple positives. In 1840 W H Fox Talbot invented the negative-positive calotype process. He also introduced the use of sodium thiosulphate as ‘fix’ which removed the unexposed silver salts after the image was produced so that it did not blacken all over when displayed. The chemicals and the essence of the processes continue to be used in black and white photography to the present day, even in some types of digitally generated prints. For this reason, W H Fox Talbot can be said to have laid many of the foundations of modern photography.

In the following decades many new processes appeared and the mass photography market grew rapidly. Towards the end of the 19th century and in the early 20th century a number of processes were employed with the purpose of producing longer lasting images or more artistic effects and used metals other than silver, or pigments. These are often referred to as ‘alternative processes’ meaning alternative to mainstream silver processes. At the end of the 19th century, photography became more reliable and consistent. Emulsions[1] were introduced which were sensitive to the whole spectrum of light and printing paper was exposed to negatives in darkrooms rather than in daylight, producing repeatable results. The first commercial colour process, the autochrome process, appeared in 1904. Throughout the 20th Century many dye-based colour photographic processes were developed, expanding our photographic legacy. The first digital camera appeared in 1981 and by the turn of the century digital photography had started to replace many traditional photographic processes.

[1] Emulsion is the term used to describe the suspension of a light-sensitive compound in a binder e.g. silver bromide in gelatin.

Identification of photographic processes

Identification of photographic processes may serve different purposes. It may be necessary to date a photograph or its subject matter, to authenticate its provenance, or to determine a possible conservation treatment. The identification of photographs can be daunting. Throughout the 19th and 20th centuries, many processes appeared and many passed out of fashion. However, the vast majority of photographs belong to a relatively small group of common processes, within which many of the same materials occur repeatedly. Examples of photographs that fall outside this group are rare. In most historic black and white photographs, the image is made from silver, but it can also be made using other metals, commonly iron, platinum and palladium, or from pigments, which were used in the carbon and gum bichromate processes. Photographic processes can be identified using various methods. Some methods are only available to experts, but most photographs can be identified with the naked eye, or with low power magnification tools such as hand lenses. Good reference books are valuable aids. The table on pages 4 and 5 provides identifying features of the most common historical processes.

Causes of deterioration

Photographs are particularly vulnerable to physical, chemical and biological damage and deterioration. Handling, poor environments and low quality storage materials all have an impact on the condition of photographs. Images created through certain photographic processes are more sensitive than others, but all photographs are sensitive to poor environmental conditions. High temperature and high relative humidity (RH) will increase the rate of chemical and physical deterioration, causing silver images to tarnish, fade or discolour. Colour images may fade and some early cellulose acetate film supports will break down. High temperature and low RH can cause flaking emulsion and the separation of emulsion from the support. High RH increases the risk of mould growth and insect damage. Light can cause fading, particularly of cyanotypes,[2] many colour prints and transparencies, and some silver images.

[2] Cyanotypes are brilliant blue prints formed from iron salts on paper.

Aid to identification of the most common black and white historical photographic processes and supports

	Date of Invention/Introduction (Period of greatest popularity)	Image	Emulsion (if any)	Support	Typical Presentation: Loose (L), Mounted (M), Case (C), Framed (F), Albums (A)	Identification
Daguerreotype	1839 (–1850's)	Silver and silver/ mercury amalgam	–	Silver coated copper Plate	C/F	Unique. Negative/positive image in raking light.
Photogenic Drawing	1834/1839 (1840's)	Silver (POP[1])	–	Paper	L	Paper fibres visible. Sepia – lilac brown.
Salted Paper Print	1839 (1840's–1850's)	Silver (POP)	–	Paper	L/M/A	Paper fibres visible. Sepia – reddish brown.
Calotype Print	1841 (1840's–1851)	Silver (physically developed[2])	–	Paper	L/M/A	Paper fibres visible. Sepia, but more contrast than above.
Waxed Paper Calotype Negative	1841 (1840's–1851)	Silver (physically developed	–	Paper	L	Waxed and translucent.
Cyanotype	1842 (1840's & 1880's–1890's)	Iron compounds	–	Paper	L/A	Paper fibres visible. Blue colour.
Wet Collodion Negative	1851 (–1870's)	Silver (physically developed)	Collodion	Glass	L	Hand-coated, fingermarks in emulsion and varnish at corners of plate. May be creamy colour in dark areas.
Collodion Positive	1852 (–1880's)	Silver (physically developed)	Collodion	Glass	L/F	Unique. No negative/positive image in raking light. Black backing or ruby glass.
Tintype	1856 (–1930's)	Silver (physically developed)	Collodion	Iron	L/C/F/A (Card Folders)	Cased tintypes – test with magnets over cover glass – magnetic field. Rust blisters.
Albumen	1850 (–1890's)	Silver (POP)	Albumen	Paper	L/M/F/A	Usually finely crazed emulsion. Yellowish sepia. Thin paper base. Tendency to curl.
Collodio-Chloride	1864 (1880's–1910's)	Silver (POP)	Collodion	Paper	L/M/F/A	Appears like gelatin POP.
Platinum	1873 (1879–1914)	Platinum	Collodion	Paper	L/M/F/A	Paper fibres visible. Degraded transfer image on facing paper. Little image fading.
Gum bichromate	1856 (1890's–1920's)	Pigment	Gum arabic	Paper	L/M/F/A	May be glossier in darker areas. May be slight relief in image. Pigment particles visible under low magnification. Pigment colour.
Carbon print	1855/64 (1868–1940's)	Pigment	Gelatin	Paper	L/M/F/A	May be glossier in darker areas. More pronounced relief image. Little image fading. Pigment colour.
Gelatin dry plate negative	1871/73 (–1930's)	Silver (chemically developed)	Gelatin	Glass	L	Usually non-image strip near border. Smooth, even, thin coating.
Silver gelatin fibre /paper based prints	1882 (–1960's) POP 1873 (–1960's) DOP	Silver (POP[3] & DOP)	Gelatin	Paper	L/M/F/A	Sometimes very pronounced mirror tarnish for DOP.
Cellulose nitrate	1889 (–1950)	Silver (chemically developed)	Gelatin	Cellulose nitrate	L/Plastic or paper wallets	Sometimes edge printed "CELLULOSE NITRATE".
Cellulose acetate	Late 1920's (to present)	Silver (chemically developed)	Gelatin	Cellulose acetate	L/Plastic or paper wallets	Sometimes edge printed "SAFETY".
Polyester	1940's/50's (to present)	Silver (chemically developed)	Gelatin	Polyester	L/Plastic or paper wallets	Not usually edge printed.
Resin-coated paper	1972 (to present)	Silver (chemically developed)	Gelatin	Polyethylene coated paper	L/M/F/A	Tends to lie flat. More plastic than plain paper supports.

[1] POP are printed out prints. This means that the sensitised printing paper is exposed, in contact with a negative, to light (usually daylight) until the final image appears. The printing paper is then fixed and washed. There is no development stage. They are usually sepia in colour.

[2] Physically developed images use silver ions from the developer which are deposited on the silver of the latent image. The silver does not usually come from the photographic emulsion itself, unless it has been dissolved in the developer solution first.

[3] DOP are developed out prints. In this case the sensitised printing paper is exposed, (usually under an enlarger) to artificial light for a shorter period of time than POP. This produces a latent image which is not visible to the human eye. The printing paper is then placed in a developer until the image appears. The silver in the image comes from the sensitised paper itself. After this, the printing paper is placed in a stop bath, fixed and washed. It is much quicker to produce than POP and the process is more controlled and the results more predictable.

Handling

When handling photographs always work on a clean, clear surface of sufficient size. The area should be cleaned with a dry or lightly dampened cloth, to remove particulate dirt which causes scratches. If necessary, cover the surface with cheap, plain paper, such as unprinted newspaper, which can be changed as soon as it becomes dirty. Examine photographs in light which has been ultra-violet filtered.
In order to minimise the risk of damage:

- Photographs should be handled as little as possible.
- Wherever possible provide a copy print or digital access rather than an original print to reduce the risk of damaging the original. Care should always be taken to ensure that the process of copying or scanning does not damage the original. Some photographs may be too fragile to copy or digitise.
- Supervise anyone who handles photographs, particularly new or untrained members of staff or users.
- Wash hands before examining photographs. Hands should be clean and free of lotions and creams. Wearing gloves is useful for handling dirty containers or outer coverings. However, using gloves, particularly loose-fitting ones, makes it hard to judge the condition of material, reduces dexterity and increases the risk of damage.
- Use two hands to hold the photograph and if possible support it with a piece of stiff card, especially if the photograph is fragile or brittle. This will reduce the risk of physical damage. Avoid touching the image surface.
- Remove envelopes from negatives and not vice versa. If a photograph appears stuck to its container, do not attempt to remove it.
- Use book supports with photographic albums.
- Do not stack loose prints/glass plate negatives or place anything on top of photographs as this will damage the surface.
- Do not attempt to flatten rolled or curled prints – they may crack and tear.
- Do not use adhesive tapes, staples, pins, metal paper clips or rubber bands.
- Do not eat, drink or smoke near photographs.
- Do not use ink to label a photograph. Use an HB pencil to write on the reverse of material and do not press hard.

Housekeeping

Simple steps can be taken to improve conditions for photographic materials which will slow their deterioration and act as an early warning system if damage is occurring:

- Monitor and control temperature and relative humidity.[3]
- Regularly check for mould, insect or rodent activity and other signs of deterioration.
- Remove damaged photographs and store separately.
- Keep research and storage areas clean. These areas should be regularly cleaned using a vacuum with a HEPA (high efficiency particulate air) filter, not swept. Apart from causing a build up of surface dirt, dust increases the risk of mould and can also cause scratches and blemishes on photographs.
- Avoid using household cleaners containing ammonia or chlorine in collection areas.
- Do not store or place photographs near a heat source such as a hot water pipe, or hang them above a radiator.
- Do not store or place photographs in direct sunlight. All light sources should be UV-filtered.
- Do not store photographs in freshly painted rooms or near freshly painted objects for at least two and preferably four weeks.
- Do not store or place photographs near photocopying machines. They emit ozone, which will damage photographs.
- Avoid using carpets in storage areas. Carpets can harbour insects pests and dirt. Woollen carpets can emit gaseous compounds of sulphur, which will damage photographs.

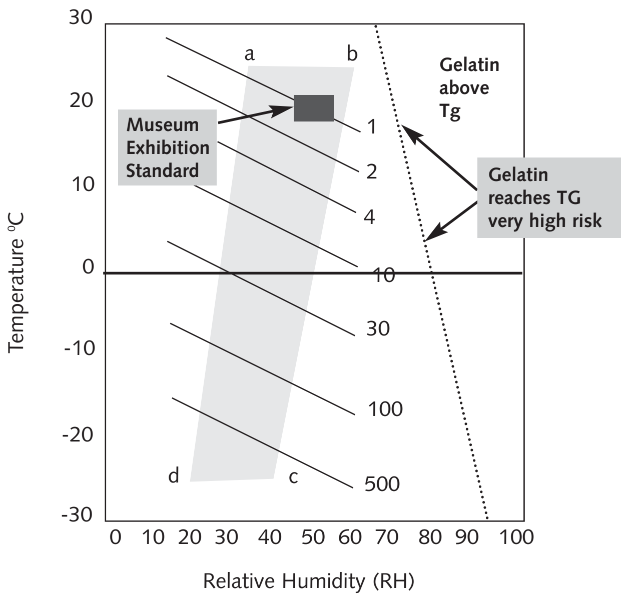
[3] Refer to the Preservation Advisory Centre booklet *Managing the library and archive environment* at www.bl.uk/npo

Environment

There are a number of environmental factors that affect photographs: temperature, relative humidity, air purity and light are the most important.

Temperature and relative humidity

Unsuitable temperature and relative humidity (RH) can cause or accelerate physical and chemical damage. Considerable research has been carried out into the optimum storage environment for photographs. This has resulted in a minimum standard for photographs, which defines physically safe temperature and RH parameters based on the physical stability of photographs with a gelatin binder. Within these parameters there are varying degrees of chemical stability. Within the safe RH range, photographs will not undergo irreversible physical changes e.g. cracking emulsions and flaking. This RH range varies according to temperature, as shown in the diagram below.



a = 25°c, 35% RH
b = 25°c, 60% RH
c = -25°c, 40% RH
d = -25°c, 20% RH

Diagram supplied by the Museums and Galleries Commission, copyright Mr M McCormick-Goodhart. (As shown in the Museums & Galleries Commission, *Standards in the Museum Care of Photographic Collections, 1996.*)

The light grey quadrant *abcd* defines the physically safe range of temperature and RH for photographs. Outside the quadrant, the dotted line shows the glass transition temperature(Tg) of gelatin, which varies according to RH. This is the temperature at which rapid image degradation is likely to occur. The diagonal contour lines (1–500) map relative chemical stability. If a photograph is stored in the environment defined by line 10 it will take 10 times longer to reach the same stage of chemical deterioration as a photograph stored in the environment defined by line 1. Lowering the RH within the quadrant at a fixed temperature will only increase the chemical stability by a factor of 2–3. However, lowering the temperature at a fixed RH can increase the chemical stability by a factor of more than 100. The beneficial effect of dropping the temperature, even by a small amount, can clearly be seen. There is considerable advantage to be gained by cold storage for more unstable material.

Conservation heating

The diagram has implications for the effectiveness of expenditure in designing storage. Initially it can be used to select a suitable level of chemical stability for a collection. This is dependent on what is already known about the stability of the material and how long it needs to be kept in an acceptable condition. In purpose built storage it is easier and more cost effective to achieve this by allowing a relatively broad range of relative humidity and narrow range of temperature (within the physically safe quadrant). However, some historic buildings without air conditioning tend to be cool but damp, particularly in winter. In such buildings heating systems can be activated by relative humidity levels. Collections will benefit from increased chemical stability as temperatures slowly drop, but if the RH goes above the physically safe level, the heating comes on and the RH falls. This is known as conservation heating.

Environmental targets

There are a number of ISO[4] standards that recommend temperature and relative humidity levels for the long-term storage of specific photographic materials. Whilst these standards should be consulted, it is acknowledged that they may be difficult to achieve, especially when institutions hold mixed photographic collections. As well as summarising the recommendations of these standards, *BS ISO 18934: 2006 Imaging materials – Multiple media archives – storage environment* describes how good a

[4] ISO standards are published by the International Organization for Standardization. ISO standards adopted as British Standards are given the prefix BS ISO.

particular storage environment is for different types of photographic material. The four storage environments considered are subzero, cold, cool and room temperature and for each type of material they are categorised as unsuitable, fair, good or very good. The temperature and RH parameters for each storage environment are shown below. Whilst unsuitable storage environments should be avoided it is likely that compromises will have to be made for some types of material. It should help you decide which types of material would benefit the most from cold, cool or subzero storage.

	Temperature	**RH**	
Subzero	-20°C – 0°C	30–50%	From BS ISO 18934: 2006 Imaging materials – Multiple media – Storage environment
Cold	0°C – 8°C	30–50%	
Cool	8°C – 16°C	30–50%	
Room	16°C – 23°C	30–50%	

The following recommendations are generalisations only and there may be exceptions. If there are concerns about particular photographs, professional advice should be sought.

- Generally, photographs on glass or metal supports are best stored at cool or cold temperatures.
- Cellulose nitrate and cellulose acetate should not be stored above cool temperatures and it is preferable to keep them in cold or subzero conditions.
- Cellulose acetate film based negatives from the 1950s should be in subzero freezer storage.
- Later black and white film base from approximately the 1980s onwards can be kept at cool temperatures and below.
- Most early colour film and early colour prints should be in cold or subzero storage.
- Black and white prints can be stored at room temperature and below, depending on condition.

Cold storage

The term cold storage can be used to describe temperatures below 16°C (cool) but it is usually used to describe lower temperatures (cold and subzero). There are two methods for storage at low temperatures. Either photographs can be stored in a controlled open environment (cold/cool) such as a humidity-controlled vault or they can be sealed in purpose-made enclosures and stored in freezers. At lower temperatures it is more difficult and costly to control the higher RH, which should be kept within the physically safe quadrant, defined in the diagram on page 8.

Sealed enclosures provide microenvironments in which an appropriate RH can be maintained. They usually have warning strips that indicate if the outer packaging has been punctured and the RH has increased beyond the safe range. Subzero storage is especially suitable for large quantities of photographs with a plastic base, particularly early safety film (cellulose acetate)[5] used for negatives (black and white and colour) and transparencies (slides). These chemically unstable photographs can be difficult to treat and conservation treatment of large quantities is not usually practical. Ideally, access copies of original photographs should be made before they are placed in subzero storage, but where substantial quantities of photographs are deteriorating rapidly, it may be necessary to place them in subzero storage first and remove small quantities at a time for copying.

If originals need to be accessed they should be acclimatised within their packaging before use. Provided photographs are brought up to room temperature whilst in sealed packaging, the acclimatisation period for some packaging kits need only be 2–3 hours. It is cost effective to purchase packaging which can be re-used. The process of acclimatising photographs to room temperature and replacing them in cold storage should not cause physical damage, provided they are always packaged in a physically safe environment first and later acclimatised from freezer storage to room temperature before opening. Frequent periods of use at room temperature involving the removal of an object from cold storage will clearly lessen the advantage of the increased chemical stability provided by cold storage.[6]

---

[5] For more information about safety film refer to Reilly, J.M., *IPI Storage guide for acetate film*, Rochester: Image Permanence Institute, 1993.

[6] For a case study refer to Bigelow, S. *Cold Storage of Photographs at the City of Vancouver Archives*, Canadian Council of Archives, 2004. www.cdncouncilarchives.ca/Storage_English.pdf

Cellulose nitrate film – a warning

Cellulose nitrate film was produced extensively between 1889 and 1939 and continued to be used up to c.1950 as a support for negatives, transparencies, x-rays and motion picture film. Some cellulose nitrate motion picture film was used after this date as old stock was used up.[7] Cellulose nitrate film can be extremely dangerous in certain circumstances, as it is highly flammable and can have a relatively low temperature of ignition of 38°C when in poor condition and kept at this temperature for extended periods. However, the issue of flammability should not be confused with that of stability, which is generally good and much better than early cellulose acetate film. After all, cellulose nitrate was produced for many years and used by many people satisfactorily. Small quantities in reasonable condition stored at cool temperatures away from sources of heat (such as sunny windows or hot water pipes) or sparks should not present a considerable risk.

However, as quantities increase, purpose built storage with adequate fire prevention needs to be provided. The greatest risk is with large amounts of densely packed material in poor condition and very large quantities will require storage in a separate building. There are considerable health and safety issues attached to any cellulose nitrate collection and the specific requirements for their safe storage and handling should be strictly adhered to, thereby avoiding unnecessary risks.[8] Once cellulose nitrate begins to burn, it produces gases which catalyse further decomposition and affect surrounding materials. Highly toxic fumes, as well as smoke and heat, are produced very quickly. It can continue to burn where there is no external source of oxygen. It is also worth noting that if the buildings or contents are insured, the policy may prohibit the storage of cellulose nitrate film. If the material is in very poor condition and beyond use contact the local authority or fire brigade for advice on disposal.[9]

[7] For more information on cellulose nitrate motion picture film refer to Smither, R., *This film is dangerous: a celebration of nitrate film*, Brussels: Federation of Film Preservation, 2003.
[8] Refer to *NFPA 40 Standard for the storage and handling of cellulose nitrate film*, Quincy: National Fire Protection Association, 2007.
[9] Refer to the HSE leaflet *The dangers of cellulose nitrate film*, Health and Safety Executive, 2003. www.hse.gov.uk/pubns/cellulose.pdf

Air purity

A number of atmospheric pollutants are capable of oxidising silver in photographs. These include, ozone, peroxides, nitrogen oxides and sulphur-containing compounds such as sulphur oxides and hydrogen sulphide. Air should be filtered, especially in collections housed in industrial areas. Avoid using materials and equipment that emit pollutants e.g. certain paints and varnishes, photocopying machines, woollen carpets and new wood.[10] Building work and decoration can introduce contaminants, and photographs should be removed from these areas until pollutants have fallen to acceptable levels and the area has been thoroughly cleaned.

Light and display

In storage and display areas, lights should be fitted with UV filters. Ultra-violet radiation is the most damaging type of light for photographic material. When framing prints for display, use UV-filtered glass or polymethyl methacrylate e.g. Perspex™. Blinds and UV-filtering film on windows can also be used to reduce light levels. A light level of 50 lux is the maximum recommended display level and no photographs should be exposed to light levels of more than 100 lux for extended periods. Photographs should not be on permanent display, but should be rotated. Particularly sensitive photographs should not be displayed at all. The materials used for mounting display prints should conform to the same standards as the enclosure materials.

- Silver gelatin prints that have been processed according to instructions are essentially stable at low light levels.
- Most 19th century photographs, particularly from the earliest years of photography should not be displayed for long periods. The earliest photographs were experimental in nature and may be unsuitable for display.
- Other materials which may be particularly susceptible to light damage include early colour film and colour prints, cyanotypes and early resin-coated prints.

[10] Refer to Tétreault, J., C*oatings for display and storage in museums*, Ottawa: Canadian Conservation Institute, 1999.

Housing

Many types of housing are unsuitable for photographic storage and this is a common cause of damage to photographs. Good quality storage materials are available in paper, board and plastic and their use will significantly enhance the longevity of photographs.[11]

Paper used for housing should:
• have a high alpha-cellulose content (above 87%)
• have a pH of 6.5 – 7.5
• have an undetectable reducible sulphur content
• be free of lignin, pH buffers, metal particles, acid, peroxides and harmful sizing agents.

Photon™ paper and Argentia paper are both made from 100% cotton fibre and are particularly suitable for photographic storage. Museum boards, such as Heritage TG Off White and Dull White can be used for framing and additional supports or barriers. Unbuffered materials are generally considered the most appropriate for photographs. Buffered box boards housing photographs within individual unbuffered enclosures are unlikely to cause damage, provided the box boards fulfill the other criteria listed above. The most widely accepted plastic material for use as enclosures in conservation is inert polyester film e.g. Melinex® or Mylar®. Any plastic used should be free of plasticiser, and the surface should not be glazed or coated. Polyvinyl chloride (PVC) should not be used. Enclosures are available in a variety of designs and many suppliers provide custom-made enclosures.

[11] Many manufacturers test their products using the Photographic Activity Test (PAT) and advertise storage materials which pass the PAT. Developed by the American National Standards Institute (ANSI) the test determines whether or not a storage material will cause fading or staining in photographs. The PAT standard code is *ANSI IT9.16 Photographic Activity Test*. In addition, ANSI has another standard *ANSI IT9.2 Photographic Processed Films, Plates, and Papers – Filing Enclosures and Storage Containers* which specifies the high quality of the paper and plastics, and recommends designs for storage materials such as envelopes and pocket pages. Materials that are described as photo-safe should meet the requirements of the International Standard ISO 18902:2007. PAT tested material is not necessarily photo-safe.

Different types of photograph should be stored separately to avoid physical and chemical damage.
• Photographs with glass supports can be housed in four flap paper enclosures and stored vertically in boxes or in custom-made cabinets.
• Plastic black and white negatives and all transparencies (slides) can be housed in polyester sleeves and stored in photographic storage boxes or a hanging file system in metal cabinets. Sleeves should not be completely sealed. They can also be kept in purpose-made packaging in cold storage.
• Most black and white and colour prints can be housed in polyester sleeves using photographic conservation paper or museum board as a support if necessary. Prints with delicate surfaces, such as flaking emulsion or lifting pigments should be stored in paper enclosures. Sleeves should not be completely sealed. They should then be stored in photographic storage boxes or files.
• Photograph albums were often made of low quality materials which can damage photographs. It is also common to find raised decoration on the bindings, which is easily abraded. These albums should be stored in made-to-measure drop-front boxes.

Polyvinyl chloride plastics, glassine envelopes, mechanical wood pulp papers and old photographic suppliers' boxes (although they may be of some interest in themselves) are all unsuitable for photographic storage. If they are of historic interest they should be stored separately from the photographs. Metal storage furniture is preferable to wooden storage furniture. The metal should have a baked enamel or powder-coated finish. Plastazote™, an inert polyethylene foam can be used to line shelves or drawers in order to soften hard surfaces. While old wood may be safe, new wood must be avoided, especially if it has been bleached or freshly painted because it gives off harmful gases. MicroChamber® paper/board can be used as a temporary measure for lining existing unsuitable storage furniture before replacement. Fragile material such as glass plate negatives should not be stored on mobile shelving.[12]

[12] For more information on storage furniture refer to the Preservation Advisory Centre booklet, *Specifying library and archive storage* at www.bl.uk/npo

Conservation

Some types of deterioration and damage can be treated more satisfactorily than others. Cleaning and structural repairs are the most common conservation treatments. It is also common to remove materials that are causing damage or could cause damage to photographs (e.g. discoloured brittle paper negative enclosures), and if necessary, replace them with appropriate materials. Appropriate materials can also be used as barriers e.g. as inserts in a bound volume, manuscript or album which is made of poor quality paper or when packing, mounting or framing a photograph. This can make a considerable difference to the life of the photograph. Mould damaged areas of a photograph can sometimes be treated to prevent further deterioration but reconstruction of a mouldy image is usually not possible. It is not possible to reverse fading and tarnishing in the original photograph without the risk of further damage. Conservation is often accompanied by recommendations for improvements in the storage environment, and for safe use of the photographs. Photographs are complex objects that are easily damaged. Cleaning, consolidation,[13] repair and flattening of photographs should only be carried out by an accredited photographic conservator.[14] Certain procedures can be undertaken after training by a conservator e.g. some minor cleaning and re-housing.

Digitisation

Digitisation of historical photographs has become widespread. It is a useful means of making photographs accessible and in many cases reducing handling of the original. However, it needs to be carried out with considerable planning to ensure that the historic photographs are not damaged by environmental changes or handling during the process. The technology used needs to be the most appropriate. Digitisation can only ever represent part of the information contained in the original photographic object and should not be considered a permanent cheap alternative to the care of the originals. It is almost certain that the originals, stored and used sympathetically, will last for longer than the digital technology needed to view the images.

[13] Consolidation, in this context, is the reattachment of flaking or detaching emulsion.
[14] A conservator accredited by Icon, the Institute of Conservation or the Society of Archivists.

Online resources

Center for the legacy of photography
www.legacyofphotography.org

Graphics Atlas
www.graphicsatlas.org

Image Permanence Institute
www.imagepermanenceinstitute.org

Notes on photographs
www.notesonphotographs.org

Additional Reading

Adelstein, P.Z., IPI media storage quick reference, Rochester: Image Permanence Institute, 2004

Baldwin, A. Looking at photographs: a guide to technical terms, Los Angeles: Getty Publications, 1991

Ball, S. et al., The care of photographic materials and related media: guidelines on the care, handling, storage and display of photography, film, magnetic and digital media, London: Museums & Galleries Commission, 1998

Bigelow, S., Cold Storage of Photographs at the City of Vancouver Archives, Canadian Council of Archives, 2004

British Standards Institution, BS ISO 18902: 2007 Imaging materials – Processed imaging materials. Albums, framing and storage materials, London: British Standards Institution, 2007

British Standards Institution, BS ISO 18934: 2006 Imaging materials – Multiple media archives – storage environment, London: British Standards Institution, 2006

Image Permanence Institute, A consumer guide to traditional and digital print stability, Rochester: Image Permance Institute, 2003

Image Permanence Institute, Consumer guide for the recovery of water-damaged traditional and digital prints, Rochester: Image Permance Institute, 2004

Jurgens, M.C., The digital print: identification and preservation, Los Angeles: The Getty Conservation Institute, 2009

Lavéndrine, B., Preventive conservation of photographic collections, Los Angeles: The Getty Conservation Institute, 2003

Lavéndrine, B., Photographs of the past: process and preservation, Los Angeles: The Getty Conservation Institute, 2009

Lenman, R., The Oxford Companion to the Photograph, Oxford: Oxford University Press, 2005

Museums & Galleries Commission, The Care of Photographic Materials and Related Media, London: MGC, 1998

Museums & Galleries Commission, Standards in the Museum Care of Photographic Collections, London: MGC, 1996

National Fire Protection Association, NFPA 40: Standard for the storage and handling of cellulose nitrate film, Quincy: National Fire Protection Association, 2007

Reilly, J., Care and Identification of 19th Century Photographic Prints, Rochester: Kodak, 1986

Reilly, J.M., IPI Storage guide for acetate film, Rochester: Image Permanence Institute, 1993

Reilly, J.M., Storage guide for colour photographic materials, Rochester: Kodak, 1998

Smither, R., Surowiec, C.A. eds, This film is dangerous: a celebration of nitrate film, Brussels: Federation of Film Preservation, 2003

Tétreault, J., Coatings for display and storage in museums, Ottawa: Canadian Conservation Institute, 1999

Valverde, M.F. Photographic negatives: nature and evolution of processes, Rochester: Image Permanence Institute, 2005

Wilhelm, H., Brower, C., Permanence and Care of Color Photographs: Traditional and digital color prints, color negatives, slides, and motion pictures, Grinnell: Preservation Publishing Company, 1993