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Conservation in the Age of Environmental, Social, and Economic Climate Change

Climate Change and its Destructive Effect on Mechanical, Physical and Tonal Qualities of Historical Albumin Photographs Prints (Comparison Study)

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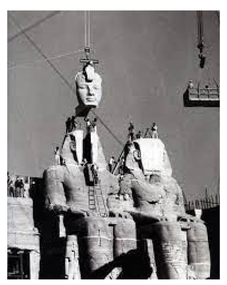
Abstract
Black and white gelatin and album photographs prints were the most popular prints of the 20th century. Photographic collections are exposed to many factors of damage within museums and libraries as a result of climate change, whether as a result of poor display or storage. This paper compares changes in chromatic, physical, chemical, and mechanical damage aspects between black and white gelatin and albumin photographs. Photographic samples of black and white gelatin and albumin were used. The samples were exposed to controlled environmental degradation factors: temperature, humidity, UV rays, and sulfur gas. The change in mechanical properties has been compared by estimating the tensile strength, elongation percentage, and determination of resistance breakout force and tear. The difference in tonal qualities and chemical properties was compared. The change in chemical properties was compared by using a scanning electron microscope with EDX. Infrared analysis was used to compare the difference in the functional groups, as identifying the manifestations of damage and their causes is the first stage in the conservation plan to protect its sustainability.

The importance of preserving photographs against climate change in recording and documenting historical Egyptian events

Clothes and Fashion

Crafts and Industries

Historical Events



Materials and Methods
Tables and previous forms as a result of the physical properties, which has samples photographs before the exposure factors damage its operations after the exposure operations after cutting it to a fixed Format area of 10 cm × 5 cm according to the type of device used then record the ratio as follow:

Tensile Strength
It is clear that the tensile strength, which represents gravity to cause rupture in a paper photo under tensile ability is destined Newton. In the standard sample (190.0) represents the largest sample value after exposure to heat (179.7) and explains that displays photographs of the fragile and rupture easily as a result of exposure to high temperature, but for that show images of high humidity, the value of the tensile strength (173.9) makes them less resistant to tearing and fragility, and when exposing the samples to UVA tensile strength where it was (177.9) which explains to break the fiber in the paper used as a support for the image which affects the physical properties of the image in photographic prints, and when the exposure of sulfur gas was valuable tensile strength (178.1), while at the exposure to nitrogen gas the value of the tensile strength (183.0), the closest standard value of the sample and this shows that the nitrogen gas did not affect a significant impact on the image of the damage photographic prints.

Elongation
Clear that the rate of elongation, which represents the increase used in the length of the paper photo tested when screwing in the standard sample (5.08) larger clearly from the sample after exposure to temperature, which was (3.616) This demonstrates that displays the image of heat reduces many of its water which affects the physical properties and flexibility to the paper, this is also clearly appears when exposing the sample to UVA and sulfur gas, while the rising rate of elongation in the samples that have been exposed to moisture and nitrogen gas and this confirms that the nitrogen gas from to preserve photos.

Penetration Strength
Tables and previous forms test result breakout force and tear that has samples photographs before and after exposure to factors Wind in different places, which represent necessary to bring about a breakthrough or holes or rupture in photographs tested the ability of newton of force as evidenced different places resistance samples photographs of penetration operations and tear according to the places of weakness out as well, according to the direction of the paper fibers used as a pillar of the image, where comparing the sample before the exposure process, we find that breakout force her higher after exposing the sample to heat where gave results (6.90) Newton of the sample before exposure while giving results (6.16) Newton after exposure to heat, which shows the extent of vulnerability and weakness has reached photo after heat exposure as a result of loss of water content and thus become brittle dry. While the power of penetration has increased in the samples after exposure to humidity, nitrogen, and continued to rise when exposed to sulfur gas and ultraviolet radiation, and this shows that the fiber of the content of water lost through high temperature is more factors which effect of suppleness and therefore their physical properties.

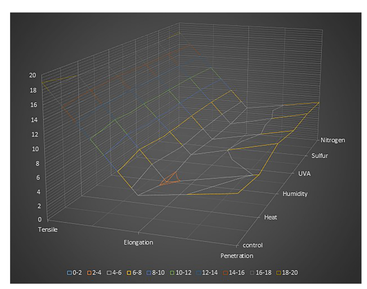
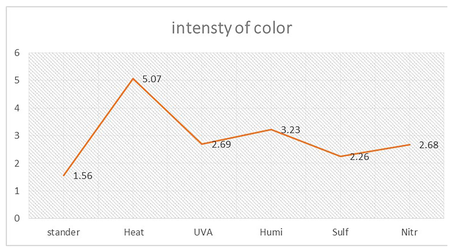
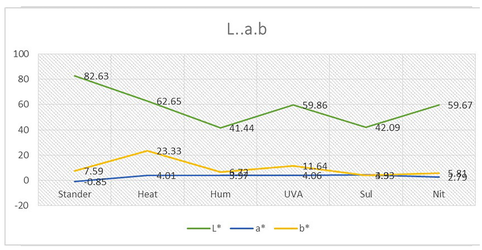


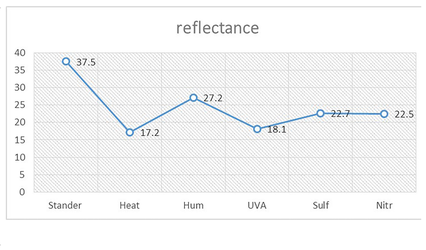
Diagram shows the tensile strength, elongation, and penetration strength of the samples photographs that have been subjected to physicochemical factors damage compared to a standard sample

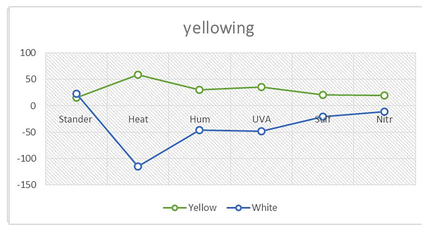
Calculate the ratio of degradation
To calculate the ratio of mutation (degradation) in the samples after exposure to the damage factors divided the difference between the value of control sample and the value of sample after exposure by the value of control sample multiplying 100 as equation: $\frac{value\ of\ control\ sample - value\ of\ exposured\ sample}{value\ of\ control\ sample} \times 100$

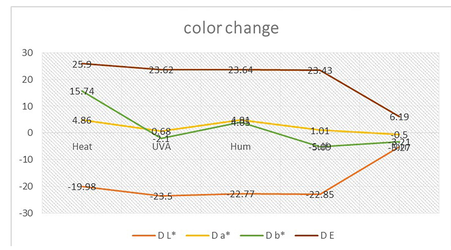
Tonal Qualities



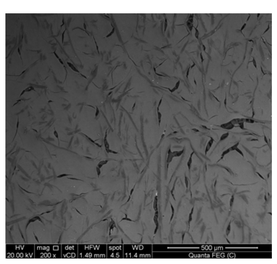


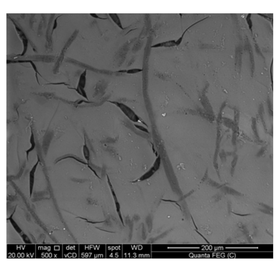


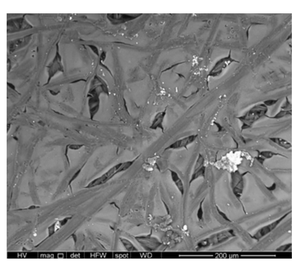


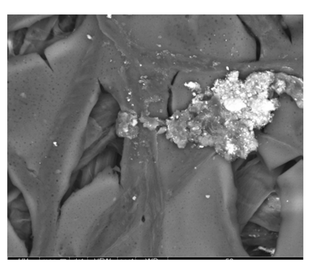


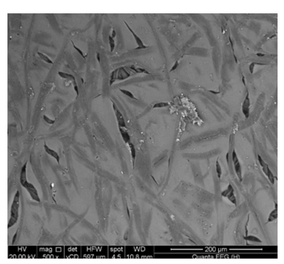
SEM-EDX

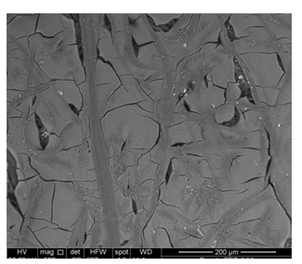


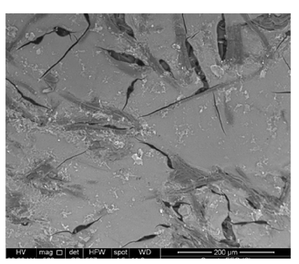












Conclusion
Many results have been reached by studying the effect of physiochemical damage to silver, gelatinous photographs (black and white) as a result of display and storage. The most important results are summarized as follows:
experimental results
- The experimental study confirmed that exposure of images to high heat leads to deterioration in gelatin as a result of rearranging the molecular structure of gelatin, and it also reduces the tensile strength and elongation of the supporting paper.
- The exposure of photographs to low humidity leads to high humidity that helps stop the deterioration processes in photographs as a result of gelatin swelling with the water molecule
- Exposure of photographs to ultraviolet light causes the paper's resistance to penetration and tear to decrease, as does fading and yellowing of the photograph.
- Exposure of photographs to sulfur dioxide as carbide C2S for one and two weeks affects the structural unit of gelatin.
- The exposure of photographs to nitrogen gas N2 for one and two weeks did not have a clear effect on the molecular structure of gelatin.

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