

## **Study of the effect of various damage factors on the damage of the glass artifacts kept in historical stores and the methodology of treatment and conservation applied on the glass artefact kept in Museum of Islamic Art in Cairo**

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### **Abstract:**

Glass is a relatively stable material in the normal preservation environment, compared to other materials, as its rate of deterioration is somewhat slow, and does not appear clearly until long periods have elapsed. Because the impact of the different deterioration factors of glass effects varies according to conservation conditions, Therefore the research discusses the factors and causes of the damage of glass effects kept in historical stores.

The research presents a case study for the restoration of glass artefact preserved in the Museum of Islamic Art in Cairo, the aim of the research is to study the chemical composition of the artefact, its components, and the extent of its damage in addition, the restoration and storage operations were carried out. Therefore, many different examinations and analysis were used, including imaging with the portable optical microscope, scanning electron microscopy and analysis using scanning electron microscope provided with (EDX) unit and XRD analysis. Glass restoration and conservation operations have been carried out, including mechanical and chemical cleaning, assembly and completion of the missing parts. The storage process was carried out using materials that were mostly acid-free and in a supportive manner to preserve the impact during the storage process.

This paper deals with the factors and aspects of stored glass via the following main points:

### **a-Indogenous Deterioration Factors:**

These factors are connected with structuring and making glass artifacts as the defects of manufacturing glass include many causes of damage. one of them arises from the inconsistent chemical structure of glass or while the maker's preparation of materials and mixture of glass or during temperature treatment which results in many manifestations of damage such as cracks, bubbles, stoning, devitrification and sandy impurities.

### **b- Exogenous Deterioration Factors:**

These factors are connected with the nature of surrounding atmosphere. The effects of atmosphere, and aspects of deterioration resulting from it, have been studied. The phenomenon of glass corrosion has been studied, the occurrence of its mechanism, along with the damage manifestations resulting from it, has been explained. The study includes hydrogenous glass, glass opaqueness, white opaque layers (white rust) and the phenomenon of weeping glass, pitting of glass and iridescence.

Furthermore, this chapter studies the effects of atmospheric pollutants, temperature, microorganisms (biological damage), vibrations and human damage. One of the most important manifestations of human damage done to glass artifacts is faulty restoration, carelessness, bad storage of glass artifacts, not applying periodical conservation and protection measures, lack of awareness of some people who are responsible for the safe custody of artifacts and the rarity of man who are trained on standard methods of storage and theft prevention.

### **Applied study on selected stored glass artefact:**

This paper deals with the conservation and protection of glass artefact stored in Museum of Islamic Art in Cairo: This glass artefact with a record number (6102), it is a flask of greenish glass). The documentation and registration of the artefact has been done using AutoCAD and photographic registration. The deterioration aspects done to this registration have been observed. The processes of examination and analysis has been carried out using scanning electron microscope attached with EDX unit, X-Ray diffraction, Infra-Red Absorption spectrophotometry and microbiological inspection.

After the process of restoration and conservation has been fulfilled, the process of mechanical cleaning starts using safe technique was performed, and then the process of chemical cleaning and initial assembling carried out using 1092 Araldite. Under the process of completion, it has been deduced that there is no need to carry out the double and singular mould in the process of the completion of missing parts of glass. Finding creative solutions that suit the state of the artefact and the places of the missing parts should be thought of. This is clear in the glass artifacts under study. The process of consolidation and protection comes after that by Nano paraloid B-72 added to Nano Zinc which proved to be successful in the experimental side. The process of storage carried out with materials most of which were acidity –free, using simple techniques and tools that can be followed in the process of preservation and storage.

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