



Cairo university

Faculty of Archaeology

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**Study of factors affecting deterioration of archaeological glass
objects used for medical purposes and methods of treatment and
conservation
(Applied on some selected objects)**

For the Fulfillment of the Degree of Doctor of Philosophy (PhD.) in the
Conservation of Antiquities

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Human history and culture were not self-created; but there were always introductions to that heritage. Glass has been known since the beginning of human history as archaeological records on human life show. In The Levant and Persia, a group of Medical scholars with high capabilities has emerged. They have translated some medical books developed by other nations, especially the Greeks, who excelled in this field.

Those scholars were the pioneers who started pharmacology on scientific basis. By time, Muslims became leaders in this field during the Abbasid era. This field was highly supported by Abbasid Rulers who encouraged medicine and physicians of different specialties. Archaeological glass which was used for medical purposes suffered from different deterioration factors, the method of treatment is based on the case of every object. The research was divided as follows : “Chapter one” Historicity introduction of The Emergence and Development of the archaeological glass objects which were used for medical purposes, and the most forms. It includes The emergence of archaeological glass used in medical purposes, Brief study on the progress of Muslim Scholars in pharmacy and medicine field, and use of glass in the manufacture of pots of different shapes and that there were many and varied forms and properties according to the purpose and the medical need they were made for. finally the study of some medical drugs which were used and preserved within these pots according to the ancient Islamic manuscripts.

“Chapter two” Study of The structures and properties of the Archaeological glass objects used for medical purposes and method of manufacturing This chapter includes the study of glass definition, inception, structures, the chemical composition, as well as the physical, mechanical, chemical and thermal properties, and finally its Manufacturing methods. “Chapter three” Study of the Deterioration Factors Influencing Archaeological glass which was used for medical purposes The Study deals with the endogenous factors which include the faulty manufacturing that may occur during the various manufacturing steps. Besides, there are defects resulting from faulty use or the purpose for which the model is made.

There are exogenous factors, which include factors associated with burial environment, represented in ground water and salts that have deterioration effect on the piece before and after the excavation. The deterioration Factors associated with the exposure to environment play significant role in the damage of archaeological glass used for medical purposes as a result of temperature, moisture, air pollutants, and biodeterioration, as well as the damage resulting from storage defects.

“Chapter four” Methods of Registration , Examination , Treatment and conservation of Archaeological glass which was used for medical purposes. This chapter is divided into three parts; firstly: study of the different methods of registration, i.e. archaeological, artistic, photographic and engineering registration before, during and after all stages of treatment and restoration. The second part is study of ways of

examination and analysis by using USB Digital Microscope and scanning electron microscopes as well as X-Ray analysis in order to reach scientific methods based on scientific basis for the pre-treatment process. The last part is study of the various cleaning processes; such as mechanical cleaning, chemical cleaning, ultrasonic cleaning, laser cleaning, as well as the advantages and disadvantages of each method to determine the appropriate one. It also deals with the study of materials and methods for consolidation, joining and Completion.

“Chapter five” Experimental Study This chapter contains some important points as follows

- Tools and materials of cleaning used with similar objects which were used for medical purposes according to the ancient Islamic manuscripts.
- Study of the joining and completion materials “Epoxy Materials” to know the best one to use.

From the experimental study we can determine the best restoration materials to use.

“Chapter Six” Practical Study This chapter contains two parts The first one shows the study and examination of five archaeological samples of glass which were used for medical purposes to Identify the

components of the monument material and deterioration aspects. The Scanning Electron Microscope was used to examine the samples surface thence explained the deterioration features such as cracks ,air bubbles and glass corrosion. X-Ray analysis was also used, which was helpful in identifying if there were crystallized areas and finally Energy Dispersive X ray Spectrometry (EDX) was used to know the Elements of the monument material. The second part deals with the application on the seven samples of archaeological glass used for medical purposes from Islamic art museum, which reflect several features of deterioration aspects specially glass corrosion. The study was ended with results of the findings reached , the most important Recommendations the researcher sees to implement in accordance with the study findings, and then the research was concluded with Arabic, Foreign and website references.