Morphology, Technical and Treatment study of leaded bronze, applied on some archaeological statues from Dhamar museum, Yemen.

Abstract
A group of leaded bronze statues were discovered by the Yemeni mission in Gabal Al-lawd site, Al-Gawf, Yemen, Season ٢٠٠٢ A.D, and now they are situated in Dhamar regional museum, they date back to Minaean Period in Yemen [٦th century B.C to ٢ئ B.C ], these naked human statues were selected to study.

The aims of the present paper are to study bronze alloy to get a deeper insight into the morphology and mineralogy of corrosion products, the cause and mechanism of corrosion process to control and stop it, and to identify the types of corrosion products of selected objects as well as their constituting metals in order to carry out scientific treatment and conservation to avoid the further deterioration.

To achieve that specimens from the statues were examined by metallographic microscope to determine the microstructure of the alloy and aspects of deterioration also scanning electron microscope was used to more actually examination for the statues, X-Ray Diffraction analysis was used to investigate the corrosion products and X-Ray Florence analysis was used to determine the chemical composition of the statues. The results indicated that all the selected statues were made of lead-bronze alloy, the percentage of the lead varied from ٠٣.٥٢ % to ٠١.٩٢ %.

The chemical composition of patina on the statues surfaces is essentially composed of Cuprite Cu₂O for all the group, in addition to other compounds such as Atacamite, Paratacamite, Brochantite, Chalcocite, Quartez, Orthoclase and Cassiterite. The formation of chlorides and sulfates resulted from the interaction between surrounding environment and the statues. Metallographic examination results indicated a non-homogenous structure, localized corrosion spots and the existence of lead islands in the alloy; scanning electron microscope examination showed the microstructure for the grains and aspects of deterioration and aspects of deterioration, it confirms metallographic examination results.

Finally the obtained results helped us in treatment and conservation the selected objects.