Abstract

The aim of this dissertation is application integrated approach of Metal-Environment-Corrosion system to understand corrosion mechanism and morphology in archaeological bronze collections and usage its results in risk assessment of bronze collections before, during and after excavation for preventive conservation in such collections. For this purpose, two Iranian archaeological sites were selected: Haft Tappeh in southwest Iran (Middle Elamite Period), and Sangtarashan in Luristan region, western Iran (Iron Age II and III). To study of bronze collections belong to the archaeological sites the soil environment was examined based on corrosivity and factors influencing corrosion of buried metals. The soil samples were examined by chemical and instrumental methods such as XRD and XRF, soluble salts measurements and identification of physical conditions of soil. The metallurgical features were studied by SEM-EDS and Metallography methods. To identify corrosion mechanism and stratigraphy, the XRD, SEM-EDS and Optical Microscopy were performed. The results showed two different soil environments in archaeological sites based on corrosivity: a very corrosive soil environment in Haft Tappeh is specified while the soil of Sangtarashan was moderately corrosive. Nevertheless, based on stratigraphical corrosion studies, the three types of corrosion morphology in Haft Tappeh bronzes were observed as well as bronze disease and active corrosion that resulted from corrosivity and nature of soil conditions. The corrosion morphology in Haft Tappeh bronze artefacts has similarities with Type II corrosion noted in literature but some derivations could be observed. On the other hand, corrosion morphology in Sangtarashan bronzes was similar to Type I corrosion with a three layer corrosion structure that represents some derivation from this type of corrosion stratigraphy. With regard to corrosion studies, a risk assessment method was established to identify conservation condition of bronze collections before, during and after archaeological excavation. The risk assessment stated risky conditions in excavated and unexcavated Haft Tappeh bronze artefacts while the Sangtarashan collection was in stable condition. Finally, a preventive conservation approach in three periods of archaeological activities was established based on results achieved from metal-environment-corrosion approach and risk assessment: preservation in situ of unexcavated bronzes, conservation during excavation and after excavation maintenance of bronze collections.

Keywords:

Archaeological Bronze Collections, Metal-Environment-Corrosion approach, soil environment, Risk Assessment, Archaeological Conservation, preventive Conservation