3、Corrosion of Archaeological and Historical Artifacts

Study on the distribution pattern of soluble salts in marine effluent ceramics and vacuum desalination device

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Abstract To clarify the types and distribution of soluble salts in marine effluent ceramics, two kinds of artifact samples with different porosities, white porcelain and colored pottery, from “Nanhai Ⅰ” shipwreck were tested by IC and SEM-EDS. The results showed that soluble salts primarily comprising NaCl and Na_2SO_4 are predominantly found within the pores and at the interface between the carcass and glaze, and the salt content is higher in colored ceramics with larger porosity. To improve the desalination efficiency, a non-destructive vacuum desalination device suitable for a wide range of artefacts and capable of dynamic monitoring was designed. Firstly, the effect of vacuum degree on desalination efficiency was investigated by using low-temperature glazed porcelain simulation samples. The results showed that within the range of -100 kPa to atmospheric pressure, the larger the vacuum degree, the higher the desalination efficiency, which was 1.8 times higher than that of atmospheric pressure immersion. Concurrently, both white porcelain and colored pottery cultural relics samples were used to comparative desalination experiments under vacuum and flowing water conditions. The results indicated that colored pottery, with its higher porosity, exhibited a faster desalination rate. In 120 h with flowing water, colored pottery removed a total of 11.540 mg of Cl^-, whereas white porcelain removed 4.490 mg, representing a desalination rate 2.6 times that of the former. Under vacuum conditions, colored pottery removed 39.970 mg of Cl^- in 120 h, which is 3.5 times the rate of desalination achieved with flowing water.

Keywords soluble salts; desalination; vacuum; ceramics

Reference

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