Method and System to Stabilize and Preserve Iron Artifacts

Description:

Rust formation on archaeological artifacts is a common problem as it forms a layer on the outside of the iron, but this layer itself actually prevents oxidation reactions from occurring deeper in the metal. However, if these artifacts are recovered, the high concentration of chloride ions (Cl\(^-\)) will begin rapidly oxidizing the metal in the presence of highly oxygenated air. Placing the artifacts in water, even water similar to its former marine environment, is not enough to guarantee long-term cessation of the oxidation process. Treatment to remove the chloride ions is possible through a solution of caustic chemicals, but can require long treatment times and high volumes of chemicals. This patented technology is a method and system that utilizes a dilute alkaline solution held at sub-critical temperature and pressure conditions to rapidly remove chloride ions from corroded iron artifacts. This invention will allow for marine archaeological finds to be preserved at a much faster rate than current methods.

Applications:

- Marine vessels
- Aqueous preservation

Benefits:

- Goes beyond mimicking the equilibrium conditions – removes rust-causing chloride ions
- Scalable for any size artifact; could be used for a single bolt or an entire submarine
- Tank may be constructed of clear materials, allowing for display of the artifact during process

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Figure 1: Picture of the Hunley submarine whose restoration inspired this technology.