

Studies of the Corrosion Kinetics of Metal Alloys in Stagnant Simulated Seawater Environment

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Abstract : The paper presents corrosion behaviors of Naval Brass, aluminum alloy and carbon steel in simulated seawater under stagnant conditions. The behaviors were characterized on the variation of chloride ions concentration in the range of 3.0wt% and 3.5wt% and exposure time. The weight loss coupon-method immersion technique was employed. The weight loss for the various alloys was measured. Based on the obtained results, the corrosion rate was determined. It was found that the corrosion rates of the various alloys are related to the chloride ions concentrations, exposure time and kinetics of passive film formation of the various alloys. Carbon steel, suffers corrosion many folds more than Naval Brass. This indicated that the alloy exhibited relatively strong resistance to corrosion in the exposure environment of the seawater. Whereas, the aluminum alloy exhibited an excellent and beneficial resistance to corrosion more than the Naval Brass studied. Despite the prohibitive cost, Naval Brass and aluminum alloy, indicated to have beneficial corrosion behavior that can offer wide range of application in seashore operations. The corrosion kinetics parameters indicated that the corrosion reaction is limited by diffusion mass transfer of the corrosion reaction elements and not by reaction controlled.

Keywords : alloys, chloride ions concentration, corrosion kinetics, corrosion rate, diffusion mass transfer, exposure time, seawater, weight loss

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020