PHASE ANALYSIS OF CORROSION PRODUCTS OF CARBON STEEL IN SEA WATER.

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Nowadays carbon steel continues being the most widely used metallic material in marine and coastal buildings, The economic losses, due to corrosion processes, of those countries with important industrial and social activities in coastal regions are highly significant. In this sense the evaluation of the corrosion process of carbon steel and other materials in seawater or in coastal zones is a primary task for these countries in order to design appropriate protection methods or to predict the hfe of an specific installation. In this communication we present the phases analysis, using XRD and Mossbauer techniques, of corrosion products of a carbon steel (CT3, equivalent to AISI C1020) exposed in two natural corrosion stations in the Caribbean Sea (Cuba). The exposition time runs from days to 36 months and the evaluated rusts are characteristic of samples totally immersed in seawater, from the splash zone and from coastal zones at different distance from the shoreline.

Qualitative phase analysis shown presence of Magnetite (Fe3O4), Maghemite (y-Fe2O3), Akaganeite (B-FeOOH), Lepidocrocite (y-FeOOH) and Goethite (a-FeOOH) as iron bearing phases, and CaCO3 (Calcite and Aragonite), these last ones mainly in the immersed samples. Quantitative phase analysis by XRD was implemented as a linear combination of the patterns characteristic of all the detected phases and an appropriate model for the background. The quantitative results were used in kinetic models to understand the phase transformation between the iron oxides and oxihydroxides in the studied conditions. The XRD qualitative and quantitative results were corroborated by Mössbauer spectroscopy in the temperature range of 20 to 300 K.