ABSTRACT

BEHAVIOR OXIDATION OF STEEL AISI 1020 AT TEMPERATURE OF 700 ºC IN THE ENVIRONMENT OF Na₂SO₄

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AISI 1020 steel is a low carbon steel that is used as a material for steam pipeline system at the plant. Over time usage, carbon steel will undergo degradation or damage from corrosion. Especially high temperature corrosion in the environments containing corrosive gases such as chlorine and sulfur. For it is necessary to study the corrosion resistance of AISI 1020 steel with Na₂SO₄ deposit at temperatures of 700 ºC for 1-64 hours. To determine the mechanism and the phases that form on the material after the process of oxidation-corrosion, some tests carried out, testing the SEM (Scanning Electron Microscope), EDS (Energy Dispersive Spectroscopy), OM (Optical Microscope), and XRD (X-Ray Diffraction).

The results showed that the presence of sulfur from Na₂SO₄ deposit will increase the rate of oxidation kinetics of a higher order. Rate of oxidation kinetics (k_p) AISI 1020 steel is at 8.456 × 10⁻¹⁰ g² cm⁻⁴ s⁻¹ in normal air environment [25]. In this study the kinetics of the oxidation rate (k_p) AISI 1020 steel was obtained at 2.40 × 10⁻⁹ g² cm⁻⁴ s⁻¹ (10% Na₂SO₄), 2.00 × 10⁻⁹ g² cm⁻⁴ s⁻¹ (20% Na₂SO₄), and 2.75 × 10⁻⁹ g² cm⁻⁴ s⁻¹ (30% Na₂SO₄). XRD shows that the phases are formed Fe₂O₃, Fe₃O₄, FeO, NaFeO₂, and FeS. Overall oxidation-corrosion steel AISI 1020 in the Na₂SO₄ higher than in normal environments at temperatures 700 ºC for 1-64 hours time.

Keywords: High temperature corrosion, AISI 1020, Na₂SO₄ deposit, the rate of oxidation kinetics (k_p).