Effect of Ethanolamine on Corrosion Behavior of WB36CN1 Steel in Simulated Secondary Circuit of Pressurized Water Reactor

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Effect of ethanolamine (ETA) on corrosion behavior of WB36CN1 low alloy steel in simulated pressurized water reactor (PWR) secondary circuit conditions was studied by electrochemical methods, scanning electron microscopy (SEM), 3D microscopy, and X-ray Photoelectron Spectroscopy (XPS). The polarization curve indicated that ETA can inhibit the cathode and anode processes, and corrosion current density decreased with increasing ETA concentration. EIS results showed that the charge transfer resistance and the oxide film resistance increased with increasing ETA concentration. The XPS results indicated that the main compositions of oxide film on the WB36CN1 steel were both Fe₃O₄ in the different solution (no ETA and 24ppm). SEM analysis suggested that the film oxide became more dense with increasing ETA concentration. Thus, the corrosion rate of WB36CN1 low alloy steel in the secondary circuit of PWR decreased with an increase of ETA concentration.

Keywords: WB36CN1 steel, PWR secondary circuit, ETA, SEM, XPS

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