Corrosion Electrochemical Behaviors of Titanium in HCl-acidizing Fluid Used in Natural Gas Exploitation

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The corrosion electrochemical behaviors of titanium in HCl-acidizing fluid used in natural gas exploitation were investigated using weight loss measurement, polarization curves and electrochemical impedance spectroscopy. The surface morphologies and composition of sample before and after corrosion were examined using electron scanning microscope coupled with energy dispersive spectrometer. The results show that corrosion resistance of titanium in HCl-acidizing fluid depends on the balance between the dissolution and formation of passive film on titanium. This balance shifts towards the dissolution as the HCl content increases, causing a decrease in corrosion resistance. The remaining dissolved-oxygen in the solution accelerates the formation of passive film and therefore the corrosion resistance first increases with time, then, the formation of passive film is delayed because of depletion of dissolved-oxygen, hence a decrease in corrosion resistance.

Keywords: Corrosion; Acidizing fluid; Titanium; Passive film

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