49845

CORROSION RESISTANT MATERIALS FOR SCWO-APPLICATIONS. EXPERIMENTAL RESULTS FROM LONG-TIME EXPERIMENTS.

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ABSTRACT

Corrosion during SCWO treatment is localized in the preheater and cooler sections of the apparatus. In former experiments, titanium has been proved more corrosion resistant than Ni-base alloys also in the highly corrosive environment of the cooler of SCWO apparatuses. For the experiments, tube reactors made of alloy 625 equipped with liners made of titanium grade 2 in the preheater and the cooler sections were exposed to solutions containing hydrochloric, sulfuric or phosphoric acid.

To measure the low corrosion rates, exposure times were longer than 1000 h. Experimental pressure was 24 MPa and temperature from 20 up to about 600 °C in the middle part of the reactor. Although the gap between Ti-liner and pressure tube was not leak-free closed, corrosion was suppressed. If the solution contains only chlorine phosphorous and oxygen, titanium is an appropriate corrosion resistant material also at higher chloride concentrations. In the case of sulfuric acid solutions the liner has been severely attacked.

Keywords: alloy 625, high-temperature water, HCl, H_2SO_4, H_3PO_4 Supercritical Water Oxidation, SCWO