Studi perilaku production tubing baja paduan rendah 3 cr dan baja karbon api 5ct j55 dalam lingkungan air formasi = Study of corrosion behaviour low bearing 3 cr alloy and api 5ct j55 production tubing steels in produced water

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Abstrak

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Korosi pada tubing baja karbon merupakan masalah serius bagi eksplorasi dan produksi minyak dan gas. Perilaku korosi baja paduan rendah 3%Cr (3Cr) dan baja karbon J55 dalam lingkungan air formasi diinvesitigasi dengan menggunakan pengujian tafel polarisasi potensiodinamik, electrochemical impedance spectroscopy (EIS) dan pengamatan metalografi. Komposisi dan morfologi dari produk korosi kedua baja dianalisa dengan energy dispersive spectroscopy (EDS) dan scanning electron microscopy (SEM). Hasil pengujian memperlihatkan adanya korosi lokal pada baja J55 dengan struktur mikro pro-eutektoit ferit dan perlit, dan tidak terlihat pada baja 3Cr dengan struktur mikro martensit temper dikarenakan terbentuknya lapisan produk korosi kaya-Cr yang padat, kontinyu dan melekat dengan baik ke permukaan baja. Lapisan produk korosi yang bercelah dan tidak kontinyu pada baja J55 menyediakan jalan bagi ion-ion agresif untuk masuk dan menimbulkan korosi lokal pada permukaan baja.
ABSTRACT
Corrosion of carbon steel tubings is a serious problem for oil and gas wet exploration and production. Corrosion behaviour of low bearing 3%Cr (3Cr) alloy steel and J55 carbon steel in produced water were investigated by polarisation potentiodynamic tafel, electrochemical impedance spectroscopy (EIS) and metallography observation. The composition and morphology of corrosion products were analyzed by energy dispersive spectroscopy (EDS) and scanning electron microscopy (SEM). The results show that there was localized corrosion was observed in J55 carbon steel with pro-eutectoid ferrite and pearlite microstructure, which did not exist in 3Cr steel with tempered martensite microstructure due to formation of a dense, continuous and adherent Cr-rich scale on surface steel. Many pits in the less adherent corrosion scale of J55 carbon steel could build up ion-diffusion channels which would degrade the protective capabilities of the product films and aggravate localized corrosion.
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