

INTISARI

Penggunaan demulsifier berbasis asam asetat dalam proses pengolahan *crude oil* yang mengandung *soap emulsion* memberikan dampak korosi terhadap sistem perpipaan yang terbuat dari baja karbon. Penelitian ini bertujuan untuk mengetahui laju korosi baja karbon API 5L Grade B di dalam larutan emulsi *crude oil* yang mengandung asam asetat dengan penambahan inhibitor organik berbasis amine sehingga dapat ditentukan konsentrasi inhibitor yang optimal.

Pengujian korosi menggunakan metode polarisasi (*tafel plot*) dan kehilangan berat kupon (*weight loss coupon*). Larutan pengujian berupa campuran 10% *crude oil* dan 90% brine ditambahkan demulsifier berbasis asam asetat sebesar 2000 ppm dan berbagai konsentrasi inhibitor organik berbasis amine sebesar 10, 20, 40, 80, dan 160 ppm. Uji tarik, uji kekerasan, analisis komposisi kimia, dan pengamatan struktur mikro dilakukan untuk mengetahui kesesuaian dengan spesifikasi API 5L Grade B. Pengamatan SEM dan EDS dilakukan untuk menginvestigasi spesimen yang terkorosi.

Hasil penelitian menunjukkan bahwa penambahan inhibitor organik berbasis amine membuat baja tahan terhadap korosi (baja bersifat katodik), ditunjukkan dengan potensial korosi (E) pada kurva *tafel plot* yang bergeser ke arah atas/lebih positif. Konsentrasi inhibitor amine 40 ppm merupakan konsentrasi optimal yang menghasilkan potensial korosi tertinggi (E) = -359.29 mV dan laju korosi terendah (r) = 0.0678 mpy. Hasil pengujian polarisasi (*tafel plot*) ini selaras dengan *weight loss coupon* dimana laju korosi terendah (r) = 0,0535 mpy diperoleh pada konsentrasi inhibitor 40 ppm. Hasil pengamatan SEM menunjukkan efek penghambatan korosi optimal pada konsentrasi inhibitor 40 ppm, permukaan baja terlihat lebih rata dengan penampakan lapisan pelindung inhibitor. Hasil analisis EDS pada bagian terkorosi mengindikasikan pembentukan produk korosi pada bagian logam yang terkorosi.

Kata kunci: Baja Karbon API 5L Gr B, Crude Oil, Brine, Asam Asetat, Inhibitor, Amine

ABSTRACT

The application of acetic acid based demulsifier in the processing of crude oil containing soap emulsion gives corrosion impact to carbon steel piping systems. The aims of this study are to measure corrosion rate of API 5L Gr B carbon steel in the crude oil emulsion containing of acetic acid with the addition of amine based organic inhibitor, hence optimal inhibitor concentration can be determined.

Corrosion test used polarization method (tafel plot) and weight loss coupon. The test solution was a mixture of 10% crude oil and 90% brine added with acetic acid based demulsifier of 2000 ppm and various concentration of amine-based organic corrosion inhibitors 10, 20, 40, 80 and 160 ppm. Tensile test, hardness test, chemical composition analysis, and microstructure observation were carried out to determine compliance in accordance to API 5L Grade B specifications. SEM and EDS observation were performed to investigate corroded specimen.

The experiment results indicate that organic inhibitor made the steel resistant to corrosion (steel is cathodic) as corrosion potential (E) on the tafel plot curve moves up / more positive. 40 ppm of amine inhibitor is the optimal inhibitor concentration yield the highest corrosion potential (E) = -359,29 mV and the lowest corrosion rate (r) = 0.0678 mpy. This tafel result is agreed with the weight loss coupon where the lowest corrosion rate (r) = 0,0535 mpy is also obtained at 40 ppm of inhibitor concentration. SEM observation shows optimal inhibition effect at 40 ppm of inhibitor concentration, a smoother surface visible with appearance of protection layer of inhibitor on the steel. EDS analysis of corroded part indicates corrosion product formation on the corroded steel.

Keyword: Carbon Steel API 5L Gr B, Crude Oil, Brine, Acetic Acid, Inhibitor, Amine