

ABSTRAK

Larutan asam atau campurannya banyak dimanfaatkan sebagai medium dalam proses pembersihan logam dengan asam (*pickling*). Larutan asam ini mampu melarutkan oksida logam berupa kerak dan karat yang menempel pada permukaan logam. Di sisi lain, penggunaan media asam dalam proses *pickling* ternyata mempunyai efek yang sangat korosif terhadap logam. Dengan demikian, perlu adanya penambahan senyawa inhibitor korosi selama proses *pickling*. Penelitian ini bertujuan untuk memperoleh informasi tentang potensi dan mekanisme ekstrak zat warna azo dari limbah cair industri tekstil sebagai inhibitor korosi baja karbon dalam medium yang sesuai dengan kondisi *pickling*, yaitu berupa 1 liter campuran 75 mL asam klorida, 20 gram asam sitrat, dan 5 gram natrium dihidrogen fosfat. Proses ekstraksi senyawa azo dilakukan sebanyak 3 kali menggunakan pelarut kloroform dengan perbandingan volume 1:1. Hasil ekstraksi dikarakterisasi dengan FTIR dan menunjukkan kesesuaian dengan senyawa yang diharapkan. Selanjutnya, pengujian potensi inhibisi korosi senyawa azo dilakukan dilakukan menggunakan metode spektroskopi impedansi elektrokimia (EIS) dan polarisasi potensiodinamik (Tafel). Hasil pengujian EIS dan Tafel menunjukkan bahwa baja karbon terkorosi secara signifikan dan penambahan ekstrak senyawa azo dapat menurunkan laju korosinya. Pada temperatur 35°C ekstrak senyawa azo mempunyai efisiensi inhibisi sebesar 45,13% pada konsentrasi 200 ppm. Hasil ekstrapolasi Tafel menunjukkan sifat inhibisi korosi senyawa azo sebagai inhibitor campuran (inhibitor katodik dan anodik). Mekanisme inhibisi katoda terjadi melalui penangkapan ion H⁺. Sementara itu, inhibisi anoda terjadi melalui interaksi fisiosorpsi sesuai isotem asorpsi Langmuir dengan ΔG_{ads} -10,117 kJ/mol.

Kata kunci: *pickling*, *senyawa azo*, *inhibitor campuran*, *efisiensi inhibisi*.

ABSTRACT

Acid solution or its mixture is widely used as a medium in the process of acid-cleaning metal (pickling). This acid solution is capable of dissolving metal oxides, such as crust and rust attached to the metal surface. However, the use of acid media in the pickling process, on the other hand, generates a highly corrosive effect on metal. Thus, a pickling process requires a corrosion inhibitor compound as an additive. This study aimed to obtain information about the potency and the inhibition mechanism of azo dye, extracted from textile industry wastewater. The azo dye extract can act as a carbon steel corrosion inhibitor in a medium which is suitable for the pickling process, consisting of 1 liter mixture of 75 mL of hydrochloric acid, 20 gram of citric acid, and 5 gram of sodium dihydrogen phosphate. Azo compound extraction process was performed 3 times using chloroform with a volume ratio of 1:1. The extract was then characterized by FTIR which produced a compound suitable with our expected compound. After that, the inhibition potential of azo compound was performed with electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization (Tafel). The results from EIS and Tafel showed that carbon steel was corroded significantly and the addition of azo compound extract also decreased the corrosion rate significantly. At a temperature of 35°C the azo compound has an inhibition efficiency of 45.13% with a concentration of 200 ppm. Tafel extrapolation results showed the inhibitive characteristic of azo compound as a mixed-type inhibitor (cathodic and anodic inhibitors). The inhibition mechanism of the cathode occurs through the capture of H^+ ions. Meanwhile, the inhibition of anode occurs through physical adsorption interaction in accordance with Langmuir absorption isotherm with $\Delta G_{ads} = -10.117 \text{ kJ/mol}$.

Keywords : *pickling, azo compound, mixed-type inhibitor, inhibition efficiency*.