ABSTRAK

PENGARUH KONSENTRASI INISIATOR H_2O_2 PADA SINTESIS OLIGOMER 2-VINILPIRIDIN DAN MEKANISME ADSORPSI SEBAGAI INHIBITOR KOROSI DALAM MEDIUM KOROSIF JENUH DENGAN CO_2

Oleh

WINDA SAFITRI

Oligomer 2-vinilpiridin, O(2-VP) disintesis menggunakan inisiator H_2O_2 dengan konsentrasi bervariasi yaitu 0,25; 0,33; dan 0,5 mol yang disimbolkan dengan O(2-VP) A, O(2-VP) B, dan O(2-VP) C. Oligomer hasil sintesis dikarakterisasi gugus fungsi dengan *spectrometer Fourier Transform Infra-Red* (FTIR) dan berat molekul dengan *Mass Spectrometer* (MS). Masing- masing senyawa diuji aktivitasnya sebagai inhibitor korosi baja lunak dalam medium korosif NaCl 3% yang jenuh CO_2 menggunakan metode *Wheel Test*, *Electrochemical Impedance Spectroscopy* (EIS), dan metode Tafel dengan variasi konsentrasi dan suhu. Analisis permukaan pada baja lunak diamati menggunakan *Scanning Electron Microscope* (SEM). Serta oligomer hasil sintesis dipelajari 4 model mekanisme adsorpsi yaitu Langmuir, Temkin, Frumkin, dan Florry-Huggins. Hasil pengukuran dengan spektrometer massa menunjukkan bahwa produk sintesis O(2-VP) A, O(2-VP) B, dan O(2-VP) C terdeteksi mempunyai kelimpahan berat molekul 100-1000 *m*/*z* atau 1- 10 unit monomer, unit monomer paling banyak adalah dimer (*n*= 2). Hasil produk sintesis dengan aktivitas tertinggi sebagai inhibitor korosi berdasarkan metode *Wheel Test* adalah O(2-VP) C, metode EIS pada senyawa O(2-VP) A adalah suhu 30^{o}C, O(2-VP) B dan O(2-VP) C pada suhu 50^{o}C dengan masing- masing terdapat pada konsentrasi inhibitor 150 ppm. Sedangkan metode Tafel pada senyawa O(2-VP) A adalah suhu 50^{o}C, O(2-VP) B dan O(2-VP) C pada suhu 70^{o}C. Hasil analisis permukaan menunjukkan bahwa O(2-VP) A, O(2-VP) B, dan O(2-VP) C mampu menurunkan laju korosi dibandingkan monomer 2-VP mempromosikan korosi. Hasil plot terbaik pada mekanisme adsorpsi yaitu menggunakan persamaan Langmuir dengan nilai R^2 berkisar 0,9- 1.

Kata kunci: monomer 2-vinilpiridin, oligomer, inhibitor korosi, korosi CO_2, larutan korosif.

ABSTRACT

THE EFFECT OF H_2O_2 INITIATOR CONCENTRATION ON THE SYNTHESIS OF 2-VINYLPYRIDIN OLIGOMERS AND ADSORPTION MECHANISM AS CORROSION INHIBITORS IN CORROSIVE MEDIUMS SURFACED WITH CO_2

By

WINDA SAFITRI

Oligomer 2-vinylpyridine, O(2-VP) was synthesized using H_2O_2 initiator with various concentrations of 0.25; 0.33; and 0.5 mol symbolized by O(2-VP) A, O(2-VP) B, and O(2-VP) C. The synthesized oligomers were characterized by functional groups using a Fourier Transform Infra-Red (FTIR) spectrometer and molecular weight with a Mass Spectrometer (MS). Each compound was tested for its activity as a corrosion inhibitor of mild steel in 3% NaCl corrosive medium saturated with CO_2 using the Wheel Test, Electrochemical Impedance Spectroscopy (EIS) method, and the Tafel method with variations in concentration and temperature. Surface analysis on mild steel was observed using a Scanning Electron Microscope (SEM). As well as the synthesized oligomers, four models of the adsorption mechanism were studied, namely Langmuir, Temkin, Frumkin, and Florry-Huggins. The measurement results using a mass spectrometer showed that the synthesis products O(2-VP) A, O(2-VP) B, and O(2-VP) C were detected to have an abundance of molecular weights of 100-1000 *m*/*z* or 1-10 monomer units, the most monomer units are dimers (n= 2). The results of the synthesis product with the highest activity as a corrosion inhibitor based on the Wheel Test method were O(2-VP) C, the EIS method on compound O(2-VP) A was 30^{o}C, O(2-VP) B and O(2-VP) C at a temperature of 50^{o}C with each inhibitor contained in the concentration of 150 ppm. While the Tafel method on compound O(2-VP) A is at 50^{o}C, O(2-VP) B and O(2-VP) C at 70^{o}C. The results of the surface analysis showed that O(2-VP) A, O(2-VP) B, and O(2-VP) C were able to reduce the corrosion rate compared to 2-VP monomer promoting corrosion. The best plot results on the adsorption mechanism using the Langmuir equation with R^2 values ranging from 0.9 to 1.

Keywords: 2-vinylpyridine monomer, oligomer, corrosion inhibitor, CO_2 corrosion, solution corrosive.