Maltodextrin and Chitosan Polymers as Inhibitors for the Corrosion of Carbon Steel in 1.0 M Hydrochloric Acid

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The inhibition impacts of two water-soluble polymers viz., maltodextrin and chitosan on the dissolution of carbon steel in 1.0 M HCl solution were investigated by three dissimilar techniques. The investigation results indicated that the inhibition efficiencies of the examined polymers increased with their concentrations and reduced by raising temperature. The results obtained from polarization measurements proved that the investigated polymers act as mixed type inhibitors. The acquired high inhibition efficiencies of the studied polymers may be owing to powerful adsorption of the polymer molecules on the C-steel surface resulting in the construction of protective layers. Adsorption of the tested polymers on the steel surface was set to accord with Freundlich adsorption isotherm. The inhibition efficiency of chitosan was set to be higher than maltodextrin because of its high molecular mass that increases the surface area of steel covered by the polymer. The acquired thermodynamic parameters for adsorption indicated that the adsorption process is spontaneous and endothermic, and the type of adsorption is physical. The acquired outcomes from the dissimilar measurements were in a good agreement.

Keyword: Carbon steel; Polymers; Corrosion Inhibitors; Kinetic parameters; Adsorption

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