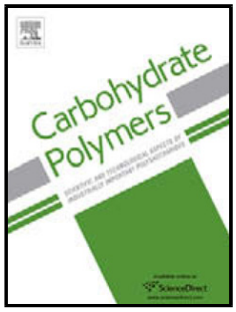

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Amino acids modified konjac glucomannan as green corrosion inhibitors for mild steel in HCl solution

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Highlights

- 1. Konjac glucomannan is modified with amino acids to prepare polysaccharide esters.
- 2. Synthetic polymers act as mixed-type inhibitors for steel in hydrochloric acid.
- 3. The adsorption of inhibitor molecules on metal surface follows Langmuir isotherm.
- 4. UV-vis spectra confirm the formation of inhibitor-Fe^{2+} complex in HCl solution.

ABSTRACT

Konjac glucomannan (KGM) was modified with amino acids to synthesize polysaccharide esters (KGMA and KGMH) which were evaluated as corrosion inhibitor for mild steel in 0.5 M HCl solution by weight loss tests, Tafel curves, electrochemical impedance spectroscopy (EIS) and scanning electron microscopy (SEM). The synthetic polymers were found to have the lower water absorbency and the higher water solubility than KGM. Gravimetric measurements showed the maximum efficiencies of KGMA and KGMH for decreasing the corrosion rate of metal at 2000 ppm are up to 89.9% and 92.4%, respectively. Polarization curves indicated polysaccharide esters could retard both hydrogen evolution reaction and metal dissolution reaction and that the inhibitory effect was concentration dependent. Besides, EIS studies demonstrated the corrosion