Biopolymer from Tragacanth gum as Green Corrosion Inhibitor for Carbon Steel in 1M HCl Solution

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FIGURES



Figure S1. Molecular structure of arabinogalactan



Figure S2 Plots of log CR vs. 1/T in the absence and the presence of various concentration of TSP in 1M HCl solution.



Figure S3 Plot of log CR/T vs. 1/T in the absence and the presence of various concentration of TSP in 1M HCl solution.



Figure S4 Equivalent circuit model to fit the data from various impedance profiles



Figure S5 FTIR spectra of (a) AG powder; (b) surface film of the carbon steel specimen after immersion in 1 M HCl containing 500 ppm AG for 6 h.



Figure S6 UV Vis spectra of 1M HCl solution with 500 ppm AG before (spectrum1) and after carbon steel immersion (spectrum 2) for 6h at 30° C.

TABLES

$30^{0}C$ 1.020.994392.31-32.46 $40^{0}C$ 1.030.995435.54-33.80	Temp.	Slope	R^2	$K_{\rm ads}$ (Lg ⁻¹)	$\Delta G_{\rm ads}({\rm kJ/mol})$
40^{0} C 1.03 0.995 435.54 -33.80	30 ⁰ C	1.02	0.994	392.31	-32.46
	40^{0} C	1.03	0.995	435.54	-33.80
50 [°] C 1.04 0.996 494.56 -35.22	50 ⁰ C	1.04	0.996	494.56	-35.22
60 [°] C 1.05 0.998 556.79 -36.64	60 ⁰ C	1.05	0.998	556.79	-36.64

Table S1 Values of adsorptive equilibrium constant (K_{ads}) and free energy of adsorption (ΔG_{ads}) at different temperatures

 Table S2 Values of thermodynamic parameters for carbon steel in 1M HCl in absence and

 presence of AG from weight loss measurements.

AG	Conc.	Pre-exponential					
(nnm)	contr	Factor	$E_{\rm a}$ (kJ/mol)	ΔH (kJ/mol)	$\Delta S (J/mol^{-1}k^{-1})$		
(hhw)		$A \text{ x10}^4 (\text{gm}^{-2}\text{h}^{-1})$					
00		10.03	51.93	49.98	-33.29		
100		1.57	44.21	42.16	-68.80		
200		0.89	41.85	39.77	-79.55		
300		0.57	39.52	37.41	-88.27		
400		0.27	36.31	34.14	-102.10		
500		0.16	34.91	32.72	-112.01		

AG	Ecorr	i (u A ami	βa	βc	D	CP	
Conc.	(mV,	ι _{corr} (μAcm	(mVdec	(mVdec ⁻		CK	η
(ppm)	Ag/AgCl)	2)	¹)	¹)	$(\Omega \text{ cm}^2)$	(mmpy)	(%)
0	-500.07	1208.5	103.46	82.79	16.53	14.04	-
100	-468.49	363.25	91.08	61.98	44.09	4.22	69.9
200	-446.21	256.84	92.71	86.86	75.83	2.98	78.7
300	-442.19	241.17	95.36	79.49	78.07	2.80	80.1
400	-442.79	141.27	121.02	72.14	138.96	1.64	88.3
500	-437.22	39.62	116.97	88.37	551.7	0.46	96.7

Table 3. Potentiodynamic polarization parameters for corrosion of carbon steel in 1M HCl in absence and presence of AG at 30^{0} C.

CAPTION OF FIGURES & TABLES IN SUPPORTING INFORMATION

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