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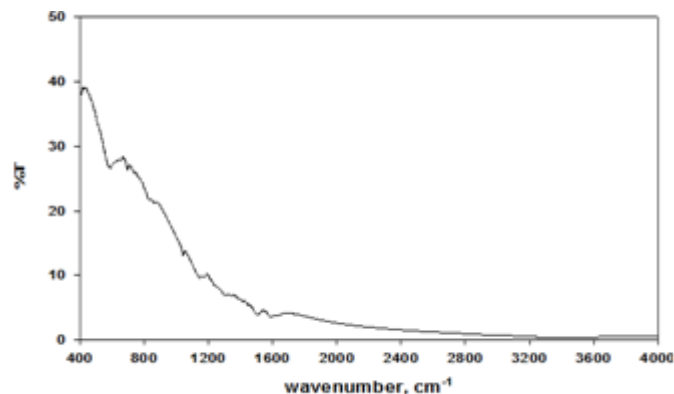


Figure 1. FT-IR spectra of the prepared polymers

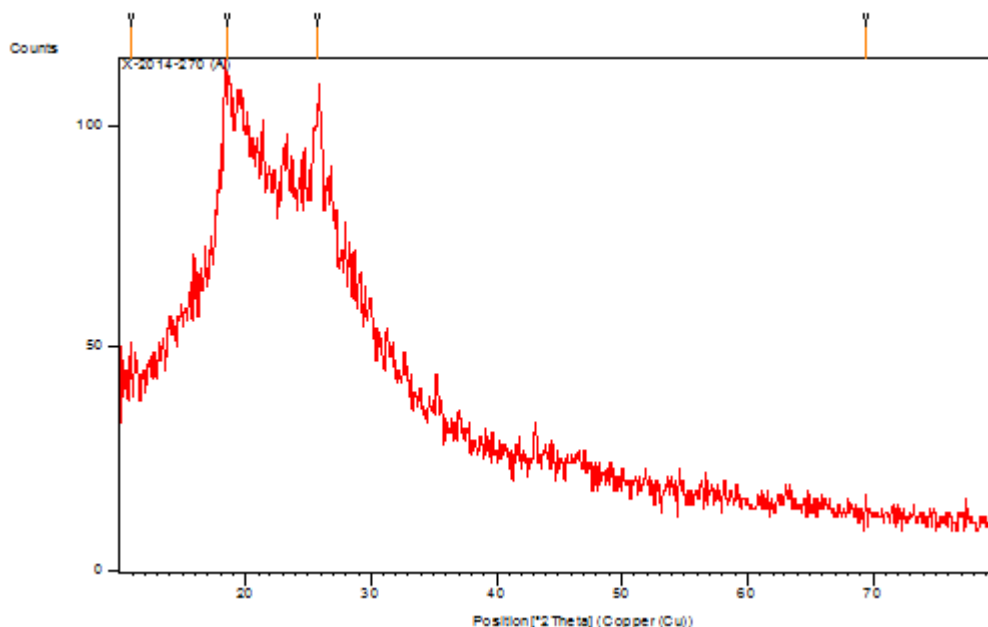


Figure 2: X-ray diffraction (XRD) patterns of the PANI nanoparticles.

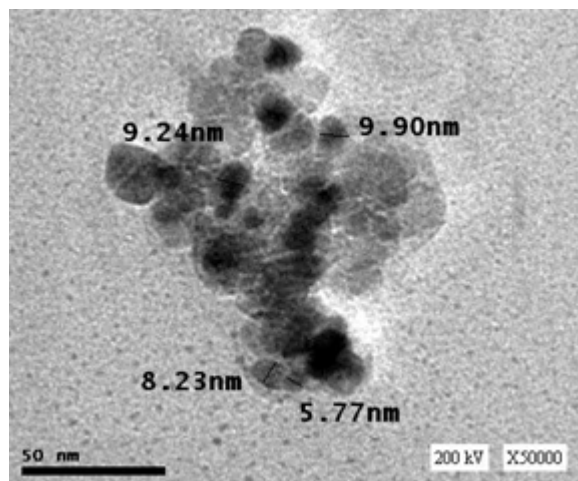


Figure 3: TEM image of polyaniline nanoparticles prepared by microemulsion polymerization

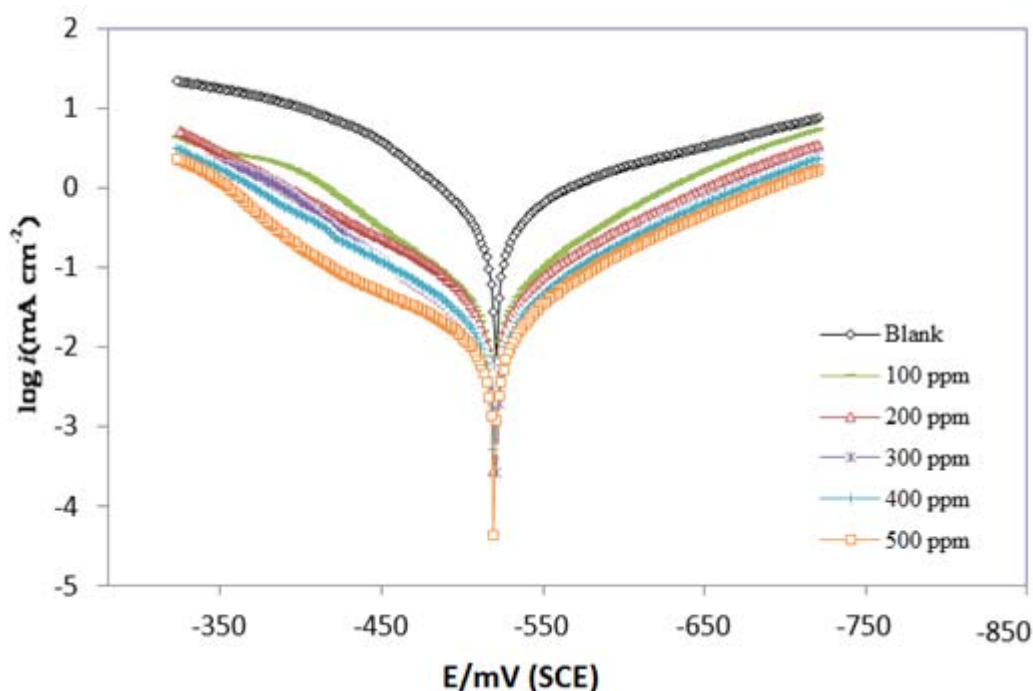


Figure 4: Potentiodynamic polarization curves for carbon steel in 1.0 M HCl containing different concentrations of nPAN at 30 °C.

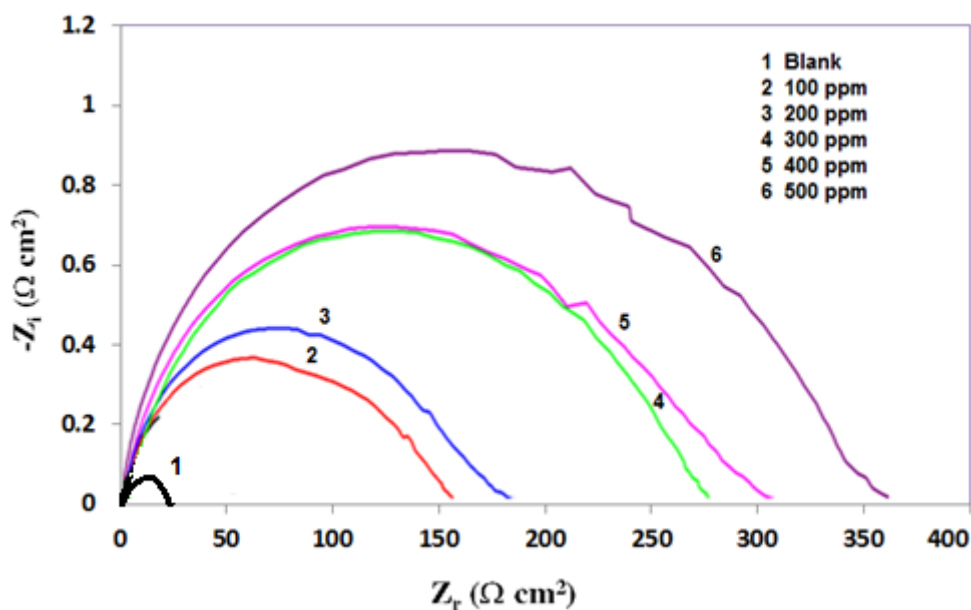


Figure 5: Nyquist plots for the carbon steel in 1 M HCl in absence and presence of different concentrations of nPAN.

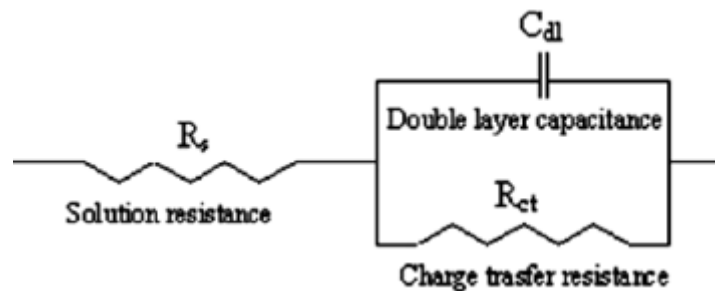


Figure 6: Suggested equivalent circuit model for the studied system.

Table 1: Potentiodynamic electrochemical parameters for the corrosion of steel in 1M HCl solution in the absence and presence different conc. of the investigated inhibitors at 30°C

Inhibitor	Concentration, ppm	$-E_{\text{corr}}$, mV vs. SCE	I_{corr} , mA cm ⁻²	β_a , mV dec ⁻¹	$-\beta_c$, mV dec ⁻¹	η_p , %
nPAN	0	-530.8	0.821	158.9	-164.9	0
	100	-519.5	0.123	123.9	-145.6	85.01
	200	-525.7	0.093	108.8	-121.1	88.67
	300	-522.3	0.07	100.4	-120.4	91.47
	400	-520.4	0.063	98.4	-87.7	92.32
	500	-521.8	0.0542	101.0	-89.3	93.39

Table 2: EIS parameters for corrosion of carbon steel in 1M HCl in absence and presence of different concentration of the nPAN at 30°C

Inhibitor	Conc. of inhibitor	R_s (ohm cm ²)	R_{ct} (ohm cm ²)	C_{dl} (μF cm ⁻²)	η_i (%)
Blank	0	0.21	20	94.34	-
nPAN	100	0.08	160	95.61	87.5
	200	1.13	180	80.23	88.88
	300	0.74	280	52.13	92.85
	400	2.21	310	23.51	93.54
	500	1.14	370	17.39	94.59