SUMMARY

Seven amino compounds such as aniline, 2-aminobenzoic acid, 3-aminobenzoic acid, 2-aminobenzene sulphonic acid, 2-nitroaniline, 3-nitroaniline and 2-aminophenol were electrochemically polymerized in HCl medium using cyclic voltammetry. During the electrochemical process, the synthesized polymers were coated on the surface of the working electrode. Carbon steel specimen was used as the working electrode in cyclic voltammetry. The coated polymers were tested for their corrosion protection capacity in 1.0M HCl solution at two different conditions. In one condition, coated samples were dried, exposed to air for 24h and immersed in the aggressive medium and performed Tafel and EIS studies. Secondly the coated specimens were immediately immersed in 1.0M HCl for 24h and conducted Tafel and EIS studies.

Electrochemical analysis data both conditions established that the polymers PANI, P2ABA and P2ABSA possess very good corrosion protection efficiency (90-100%). The corrosion inhibition capacity of nitroaniline polymers was comparatively lower than that of the above mentioned polymers. This may be due to the decomposition of the layer formed on the CS surface in acidic medium. Comparatively less anticorrosive property was shown by P3ABA on CS surface. In condition 1, P2AP showed corrosion antagonistic behaviour, while in condition 2, the same polymer acted as very good corrosion inhibitor (η_{pol}% 81). This can be attributed to the decomposition of the oligomer of P2AP in to simple molecules at condition 2 which inturn adsorbed on the CS surface more effectively.

The structural characteristics of the electrochemically synthesized polymers were compared with the structural behaviour of the chemically synthesized polymers using FT-IR technique. From this study it was understood that the polymer molecules make appreciable chemical bonds with the surface metal atoms. To explain the mechanism of corrosion protection, surface morphological analysis was also done using scanning electron microscopy. Uniformly developed polymeric coating on the surface of CS was confirmed by the morphological study.