EFFECT OF ANIONS ON CORROSION INHIBITION OF MILD STEEL IN SODIUM CHLORIDE SOLUTION

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Corrosion can be broadly defined as a surface phenomenon that occurs when a material deteriorates due to chemical interaction with its surrounding environment. Iron-containing alloys are used in different applications and they are susceptible to corrosion due to their thermodynamic instability especially in aggressive media. Corrosion of mild steel causes significant damages on economy, human safety and environmental pollution. Therefore, inhibition of corrosion is very important. The effect of different anions on corrosion inhibition of mild steel in 0.10 mol dm^{-3} of NaCl at pH=1.0 and 7.0 was investigated using the mass loss method, electrochemical impedance spectroscopy and potentiodynamic polarization techniques.

These measurements conclusively demonstrate that MoO_4^{2-}, SO_4^{2-}, ClO_4^- and $H_2PO_4^-$ have a strong ability of controlling corrosion in 0.10 mol dm^{-3} of NaCl in both acidic and neutral conditions. According to electrochemical impedance measurements, the inhibition efficiency increases with increase in the concentration of the inhibitor. Although Br^-, I^- and NO_3^- inhibit corrosion of mild steel only at pH=1.0, F^- does not act as an inhibitor for mild steel at both pH=1.0 and 7.0. Moreover, inhibition action of CrO_4^{2-} is observed only in neutral medium. However, it accelerates the rate of corrosion at pH=1.0. In addition, the potentiodynamic polarization studies reveal that these anions act as mixed type inhibitors for mild steel corrosion. It suggests that the inhibition behavior of these anions is mainly due to the formation of thin films on the surface of mild steel. The metal surface in contact with aqueous solutions becomes positively charged, and hence atoms with high electron densities of anion inhibitors can be adsorbed on the metal surface to form a protective film preventing further corrosion.