Summary and Conclusion

1- The introduction includes a literature survey of the different theories of corrosion and corrosion inhibition. The corrosion of cadmium in aqueous solutions (alkaline, acidic and neutral) is given with particular emphasis on the effect of aggressive as well as inhibitive anions.

2- The anodic and cathodic polarization curves are constructed for cadmium in sodium carbonate solutions. This is made to elucidate the effect of sodium carbonate concentrations on the kinetic parameters of the dissolution of cadmium studied. Increase of sodium carbonate concentration is accompanied by increase in the corrosion current density.

3- Additions of different concentrations of surfactants are studied in 0.1 M sodium carbonate solution. This show that:

   a- As the concentration of surfactants increases the corrosion current density decreases and inhibition efficiency is increased.

   b- The increase in inhibition efficiency is in the following order:

surfactant I < surfactant II < surfactant III < surfactant IV < surfactant V.

4- Effect of temperature on the dissolution of cadmium in 0.1 M sodium carbonate is studied, as the temperature is raised it is found that:

   a- The corrosion potential is shifted to more negative value.

   b- The corrosion current density is increased.

5- The effect of temperature on the dissolution of cadmium in 0.1 M sodium carbonate in the presence of 1000 ppm of cationic surfactants (I-V) respectively, is studied and reveals that:

a- As the temperature is raised the corrosion potential is shifted to more negative values.

b- The corrosion current density is increased.

c- The inhibition efficiency decreases.

6- Some thermodynamic parameters such as free energy of activation, enthalpy of activation and entropy of activation are calculated using the transition state equation.

7- The anodic and cathodic polarization curves are constructed for cadmium in hydrochloric acid solutions. This is made to elucidate the effect of hydrochloric acid concentrations on the kinetic parameters of the dissolution of cadmium studied. Increase of hydrochloric acid concentration is accompanied by increase in the corrosion current density.

8- Additions of different concentrations of surfactants are studied in 0.1 M hydrochloric acid solution. This shows that:

a- As the concentration of surfactants increases the corrosion current density decreases and inhibition efficiency is increased.

b- The increase in inhibition efficiency is in the following order:

surfactant I < surfactant II < surfactant III < surfactant IV < surfactant V.

9- Cyclic voltammograms are constructed for cadmium in a solution different concentrations of sodium carbonate solution which lead to:

c- Two anodic peak (A) and (C) and passive region (B) are observed before oxygen evolution takes place.

d- At high concentration of Na_2CO_3 another anodic peak appears.

e- As the concentration of Na_2CO_3 solution increases the corrosion current density of peak (A) and peak (C) increases.

9- Cyclic voltammograms are constructed for cadmium in 0.1 M Na_2CO_3 at different scanning rates show that:

a- An increase in scan rate is accompanied by an increase in the current density.

b- As the sweep rate increases, the anodic peak is observed to shift towards less negative potentials.

10- Cyclic voltammograms are constructed for cadmium in 0.1 M Na_2CO_3 in absence and presence of increasing concentrations of NaCl. Increasing of the concentration of NaCl leads to:

a- Increases the dissolution current density (i_{peak}).

b- The change in the integrated charge amount (Δq_a)increases slightly in presence of low concentrations of chloride ions, while at higher concentrations of chloride ions Δq_a changes markedly and linearly.

12- Potentiodynamic anodic polarization curves of cadmium are reported in 0.1M Na_2CO_3 containing increasing concentrations of Cl^- ions. It is found that:

a- The Cl^- ions cause the destruction of the passivating oxide film and initiating of pitting corrosion.

b- The pitting corrosion potential varies with the logarithm of molarity of Cl^- ions to give sigmoidal nature (S-shaped curve).

13- Trials are made to inhibit pitting corrosion using cationic surfactants of oleyl amido derivatives. These anions shiftes the pitting potential to more positive values, indicating the inhibition effect of these surfactants.