Summary and Conclusion

1- The introduction included a literature survey of the different theories of corrosion and corrosion inhibition. The corrosion of nickel and its alloys (Inconel 600 and Incoloy 800) in aqueous solutions (acidic, alkaline and neutral) was given with particular emphasis on the effect of aggressive as well as inhibitive anions.

2- The anodic and cathodic Tafel lines were constructed for Ni, Inconel 60 and Incoloy 800 in deaerated H_2SO_4 solutions. This was made to elucidate the effect of acid concentration on the kinetic parameters of the dissolution of the different electrode samples studied. Increase of acid concentration was accompanied by:

(I) Change the cathodic and anodic Tafel slopes.

(2) At one and the same acid concentration, the corrosion rate increases in the following sequence:

Incoloy 800 > Inconel 600 > Nickel pure

That Incoloy 800 was the less resistant one to attack by $H2SO_4$ under natural corrosion condition.

3- Addition of some dihydrazide derivative (malonic, succinic and adiapic acid dihydrazide) affected the kinetic parameters of the dissolution reaction for nickel and its alloys in 1M H_2SO_4. It is clear that as the concentration of dihydrazide compound increases:

(1) Decrease of the dissolution current density indicating the inhibiting eftbct of these compounds.

(2) The value of the cathodic Tafel slope affected by the addition of the inhibitor, but the anodic Tafel slope remains constant, indicating that this compound interferes with the cathodic reaction and consequently changes the mechanism of Ite.r and not affect the anodic dissolution of the metal.

(3) The inhibition efficiency (LE) increases as the concentration of the additive increases in the following sequance.

Compound III > Compound II > Compound I

4- Cyclic voltammograms, were constructed for nickel and its alloys in 0.1 H_2SO_4 solution in absance and in presence of increasing concentrations of NaCI. Increasing of the concentration of NaCI leads to:

(1) Increases the dissolution current density ($1_{l,,k}$).

(2) Incoloy 800 is more stable towared chloride ion than Inconel 600 and nickel.

(3) The integrated charge amount Aq_3 increases slightly in presence of low concentration of chlorid ions, while at higher concentration of chloride ions Ag_a changes markedly and linearly.

5- Potentiodynamic anodic polarization curves of Ni and its alloys were reported in 0.1M H_2SO_4 devoid of and containing increasing concentration of Cr ions. It was found that the CC ions cause the destruction of the passivating oxide, film and initiate pitting corrosion. The pitting corrosion potential varies with the logarithm of molarity of CI' ion to give segoidal nature (S-shaped curves). At one and the same Cr ion concentration the shift of pitting corrosion to less noble values increased in the order:

Incoloy 800 < Inconel 600 < Nickel pure

6- Cyclic voltammograms of nickel and its alloys in 0.1M H2SO4 + 0.02M NaCI in presence of different concentrations of organic dihydrazide compound was studied and show that :

(1)The dissolution current density (I_{pes}) and intergrated charge amount (Ag_a) decreases as the organic compound concentration increases, this indicate that the inhibition effect of this compound.

(2)At one and same inhibitor concentration, the pitting corrosion potential change toward nobel direction in the order:

Compound III > Compound II > Compound I.

7- Trials were made to inhibit pitting corrosion using dihdrazide derivative of malonic, suecinic and adipic acid. These anions shifted the pitting

potential to more positive values. Indicating the inhibation effect of these compounds.