Impedance Measurements on Nickel Metal in Aqueous salts solutions at Different Temperatures

By

Elnoor Abbakar AbdElrahman Noh
B.Sc., (Chemistry); University of Khartoum,
1991

Thesis is submitted in partial fulfillment of the Requirements for the Degree of Master of Science at the Chemistry Department, Yarmouk University, Irbid, Jordan, 1998

Approved

Prof. Mohammad M. AL-Qudah Physical Chemistry (Chairman)
Dr. Riyad Saymeh Physical Chemistry (Member)
Dr. Sabri S. Mahmoud Inorganic Chemistry (Member)

July 1998
Abstract

The electrochemical behavior of Nickel in aqueous salt solutions of 0.05M Na$_2$SO$_4$ and 0.05M NaCl at 20, 40 and 60°C has been studied in anodic regions using the impedance technique. Also the study was done under the same condition of aqueous solutions of 0.05M HCl and 0.05 M NaOH for comparison. It has been found that Nickel is passive upon applying small anodic potentials where the polarization resistance shows a remarkable high values, due to the formation of a protective oxide layer. Further increase in anodic potentials will lead to a damage in the formed oxide layer (Except in Na$_2$SO$_4$ Solution) and the electrode became active. Accordingly, the values of polarization resistance were very small and a porous layer was formed, where the pore radius has been calculated.

In the Na$_2$SO$_4$ solution Nickel electrode is clearly passive in all measured anodic potential. Where the values of polarization resistance have very large values.

Generally the activity of Nickel in the aqueous solutions is found to be follows in the sequence;

$\text{HCl} > \text{NaOH} > \text{NaCl} > \text{Na}_2\text{SO}_4$