

Anodic Dissolution of Cobalt in Ammoniacal Ammonium Carbonate Solution

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1. K. Osseo-Asare, J. W. Lee, H. S. Kim, and H. W. Pickering, *Metall. Trans. B*, **14B**, 571 (1983).

In a previous paper from this laboratory [1] it was shown that model electrochemical experiments using pure samples of cobalt, iron and their mixtures can yield valuable information on cobalt and iron behavior during ammonia leaching of reduced oxide ores. The present study extends this work by taking a closer look at cobalt electrodes. The electrochemical behavior of cobalt in an aqueous ammoniacal solution containing 2 M NH_4OH + 1 M $(\text{NH}_4)_2\text{CO}_3$ was studied at room temperature by means of anodic polarization and open circuit methods, X-ray diffraction and SEM techniques. The potentiodynamic polarization results indicate that cobalt exhibits active ($E = 550$ to -180 mV SHE), passive ($E = -180$ to 740 mV SHE), transpassive and secondary passive regions ($E = 1070$ to 1140 mV SHE). The observed passive film was identified as Co_3O_4 by X-ray analysis. The morphological and open circuit potential studies indicate that the addition of CoCO_3 into ammoniacal solution increases the dissolution rate of cobalt, with increase in the corresponding corrosion potential.