

# **Cobalt solubility at elevated temperatures in Co-CoO buffered solutions at fixed pH**

S.A. KISSIN<sup>1</sup> C. NORMAND<sup>2</sup> S.A. WOOD<sup>2</sup>

<sup>1</sup> Department of Geology, Lakehead University;  
sakissin@lakeheadu.ca

<sup>2</sup> Department of Geology, University of Idaho;  
charlesn@uidaho.edu; swood@uidaho.edu

Although abundant data on the solubility of cobalt at 25°C are available [1], there is little experimental data on cobalt solubility at higher temperatures. Hydrothermal cobalt arsenide minerals are abundant in Ni-Co arsenide-native Ag (five-element) deposits and occur as minor constituents of unconformity-type uranium and sandstone-type uranium deposits. Cobalt sulfide minerals are abundant in some stratiform copper deposits and occur as minor minerals in some Mississippi Valley-type Pb-Zn deposits.

A series of experiments was carried out using a large-capacity autoclave with a sampling system such that reaction progress could be monitored. The reaction was buffered by Co(metal) + CoO, and pH was fixed at the start of the run at 4.75 by use of the acetate buffer system. Runs were made at 50°C intervals from 100° to 300°C.

Cobalt solubility at 100°C in 0.02M acetate buffer was found to agree with previous work [2]. It was found, however, that increasing acetate concentration to 0.05M significantly increased solubility at 100 and 150°C, apparently as the result of acetate complex formation. Runs at higher temperatures apparently did reach equilibrium; however, a trend of increased solubility with increasing temperature was observed.

## **References**

- [1] Baes C.F. and Mesmer R.E. (1976) *The Hydrolysis of Cations*. Wiley, New York.
- [2] Dinov K., Matsuura C., Hiroishi D. and Ishigure K. (1993) Nucl Sci Eng **113**, 207-216.