

Genesis of Cobalt Mineralisation Associated With Kalyadi Schist Belt, Dharwar Craton, South India: A Petrological and Fluid Inclusion Study

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Abstract

The Sargur Group of rocks belonging to the Kalyadi Schist Belt (KSB) in the Western Dharwar Craton (WDC) occur as large linear enclaves within younger peninsular gneisses. This belt is known for copper mineralization and exploited good amount of copper for many years. Recent studies have shown significant concentration of cobalt up to 2000 ppm associated with copper in this belt. Earlier studies have indicated pyrite containing cobalt in its crystal lattice. In the present study an attempt has been made to understand the genesis of cobalt mineralization in this belt through detailed petrography, fluid inclusion studies along with chlorite chemistry. Two distinct ore mineral assemblages and fluid sources are proposed based on ore petrography, mineral chemistry and fluid inclusion studies. In the initial stage chalcopyrite¹ is associated with cobalt bearing pyrite and magnetite and in the later stage chalcopyrite² is associated with arsenopyrite, pyrrhotite and safflorite [(Co, As) As₂]. The initial stage fluids are characterized by low saline (~ 5 wt % NaCl equivalent) and slightly higher temperature (268° to 300° C with pressure ranging from 1.9 to 2.3 Kb), which are almost similar to temperatures obtained from the chlorite *i.e.* 202.8° to 322.43° C, this indicates that the fluids are related to regional low grade greenschist facies metamorphism. On the contrary, the late stage fluids are characterized by high density and high saline nature and show temperature range varying from 162° to 224° C with pressure values ranging from 1.4 to 1.9 Kb and in addition native Bi association suggest their derivation from the granitic or felsic magmatic source associated with emplacement of the Desani Granite in the study area. Presence of safflorite mineral associated with the second stage fluids and mineral assemblage suggest that the remobilization Co from the crystal lattice of pyrite and chalcopyrite has occurred.

Keywords: Cobalt mineralisation, Sargur Group of Rocks, Kalyadi Schist Belt (KSB), Western Dharwar Craton

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