Molybdenite from charnockites of Kondapalli, Andhra Pradesh

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The occurrence of molybdenite in charnockites from Kondapalli (Lat: 16°37′N and Long: 80°32′30″E) is reported. This region is mainly made up of charnockites (hypersthene granites, granodiorites, enderbites and pegmatites), pyroxene granulites, granites and pegmatites. Sulphide minerals—pyrrhotite, chalcopyrite and galena—from charnockites of Kondapalli were reported (Rao and Raman, 1977) to be the residual concentrates of the palingenetic charnockite melts. The occurrence of molybdenite from Donabanda hill in Kondapalli adds to the list of sulphide minerals present in the charnockites.

Molybdenite occurs as minor specks and flakes associated with pyrrhotite—chalcopyrite. It is bluish is colour and soils the fingure. Pyrrhotite and chalcopyrite often enclose and replace molybdenite. Chemically the molybdenite, has Molybdenum : 60.2%; Sulphur : 39.8% (Probe data). The X-ray data of Kondapalli molybdenite is given in Table. I.

TABLE I. X-ray data of molybdenite from Kondapalli (CuK_α - radiation)

d Å	I/I_1	hkl
6.15	100	002
3.08	5	004
2.74	15	100
2.67	10	101
2.50	6	102
2.78	50	103
2.05	15	006
1.83	20	105
1.64	5	106
1.58	10	110
1.54	9	008
1.48	4	107
1.37	3	200
1.34	5	108
1.30	4	203
1.25	2	116
1.23	2	0010
1.20	3	205
1.10	5	118
1.02	2	208

Cell parameters: a=3.16Å; c=12.30Å

The sporadic occurrence of molybdenite in association with the pyrrhotite and chalcopyrite suggests that molybdenum was also concentrated appreciably in residual liquid. Hydrothermal minerals such as allanite and biotite in palingenetic charnockites contain 60–100 ppm and 10 ppm Mo respectively, and indicates Mo concentration in the hydrothermal stage. The relative difference of Mo in hydrous minerals is perhaps related to concentration of Fe^{3+} in biotite (1.5 - 2% Fe_2O_3) and allanite (5–6% Fe_2O_3).

Ore textures in Kondapalli sulphides reveal the paragenetic sequence: molybdenite—pyrrhotite—chalcopyrite. The sulphides found along the fractures, cleavages and shear zones of hydrous minerals suggest that the sulphide phase has evolved closely following the crystallisation of biotite and allanite. The presence of molybdenite in the sulphide minerals and high content of Sn : 500–1000 ppm, in pyrrhotite indicate high temperature of formation. The mineral assemblage—feldspars and hypersthene—from the igneous charnockites has Mo content below the sensitivity limit (< 3). Accessory magnetite and ilmenite from the charnockites in Andhra Pradesh and Orissa have the usual range of 25–35 ppm Mo and rarely 100–150 ppm. The structurally emplaced igneous charnockites were subjected to metamorphism during refolding and attained palingenesis in fold crests, axes and shear zones parallel to refolding axes. The magnetites during palingenetic recrystallisation, in the presence of S rich phase in volatiles, readily changed over to pyrite (< 10 ppm. Mo) and strongly magnetic monoclinic pyrrhotite (< 2 ppm. Mo). Some part of the iron entered the biotite to make it iron-rich type. The Mo during the slow process of recrystallisation was released and concentrated into the residual

solutions. The paucity of magnetite in the coarse palingenetic charnockite and charnockite pegmatites supports this contention of sulphide formation from magnetite during palingenesis in a high grade granulite belt.

Reference

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K-Ar ages of Indian Kimberlites

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Kimberlites are ultramafic rocks, which during emplacement have incorporated a variety of mantle and crustal xenoliths and have undergone reaction with their own volatile constituents. In spite of their small volume among igneous rocks, these have been studied extensively in recent years because of their deep seated origin in the earth's mantle, and also because these are the only natural source of diamonds. Both in mineralogical and chemical composition, kimberlites show great variation; the presence of diamond is no more considered necessary for a rock to be termed as kimberlite (Dawson, 1971).

In India kimberlites are reported from Majhgawan area in M.P. and from Anantpur district in A.P. (Mathur and Singh, 1963; Rao and Phadtare, 1966). Mineralogically, the south Indian kimberlites resemble the 'hardebank' of South Africa, while the central Indian occurrences have been classified as 'altered micaceous'. Geological Survey of India have recently discovered rocks of kimberlitic affinity in a tract in the Jungel Valley in U.P. Diamonds have also been recovered from these occurrences.

This note presents new K-Ar age of a whole rock kimberlite from the Jungel Valley and discusses the implications in relation to other available ages.

A survey of the occurrences of kimberlites all the world over indicates certain common features—the most important both from the point of view of petrogenesis and prospecting being, their localisation in stable cratonic areas. Kimberlites appear to have been emplaced throughout geological time, the oldest of which is believed to be of Precambrian age at Premier, S. Africa (Allsopp *et al.*, 1967). Younger kimberlites of Eocene age are known to occur at Hearn (McGregor, 1970). But the most profuse kimberlite emplacement seems to have taken place in the Cretaceous (McGregor, op. cit.).

Radiometric ages of Indian kimberlites have been determined recently for the Majhgawan and Anantpur occurrences (Paul *et al.*, 1975). These kimberlites have been found to give K-Ar ages ranging from 840 to 1170 Ma and have been interpreted as minimum emplacement ages. This is significant in that all are of Precambrian age in contrast to most other kimberlites that were emplaced in the Mesozoic.

The result of the new K-Ar age determination from a sample of the Jungel Valley is given below. The age determination has been carried out at the Geochrono-