SHORTER COMMUNICATIONS

PRELIMINARY ORE MICROSCOPIC STUDIES ON THE SULPHIDE ORE MINERALS FROM INGLADHAL AREA, CHITALDRUG DISTRICT, MYSORE

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In the course of a general programme of study of the Chitaldrug schist belt, the area near Ingladhal (Lat: 14°8′28″ and 14°12′0″; Long: 76°26′8″ and 76°28′16″) has been investigated with special reference to the occurrence of sulphide mineralisation.

The geology of the area has been described earlier by Sampat Iyengar (1905), and Sen and Rama Rao (1929). The area represents a portion of the Chitaldrug schist belt, containing chlorite schists, ferruginous cherts, a number of trap flows and doleritic intrusions. The Belligudda hill range shows trap flows, ferruginous cherts and some schistose bands. The general strike of the formations is N–S to NNW–SSE with steep dips. The extent of mineralisation is found to be spread in the entire Ingladhal area, though concentrated occurrences are limited (according to the data till now) to the Belligudda range and its flanks. Surficial indications in the form of malachite and azurite are noticed at some places on the Belligudda hill. Primary ore mineral assemblage near the surface, and its continuation at depth have been proved by prospecting operations by the Department of Mines and Geology, Mysore State (Radhakrishna, 1967).

The ore minerals from this area are mainly pyrrhotite, pyrite, sphalerite, chalcopyrite and galena. Other minerals that are found in association with the sulphides are magnetite, ilmenite and rutile. Non-opaque gangue minerals are quartz, dolomite and chlorite.

Sulphide minerals: From the associational features, pyrite and pyrrhotite can be considered as belonging to one assemblage while sphalerite, chalcopyrite and galena form another assemblage. Pyrite is the most dominant of all the sulphide minerals; it occurs (i) as inclusion-free idioblasts with chlorite or pyrrhotite as matrix, (ii) in association with pyrrhotite, exhibiting replacement phenomenon (replacing the latter), (iii) as irregular grains containing inclusions of magnetite, rutile, ilmenite, chlorite and dolomite, (iv) in association with sphalerite, chalcopyrite and galena and (v) in association with quartz, containing it as rounded inclusions.

Pyrrhotite is next in abundance and it occurs (i) in association with pyrite, (ii) in association with magnetite and (iii) in association with dolomite and chlorite. Chalcopyrite occurs mostly in association with sphalerite and galena, but sometimes with pyrite and pyrrhotite also. Chalcopyrite and sphalerite are found as cavity-fillings in quartz matrix. Galena is the least in abundance.

Oxide minerals: Of the oxide minerals, magnetite is in dominant quantities. It occurs as zoned as well as unzoned grains in association with pyrite-pyrrhotite assemblage in chlorite and dolomite matrix. Other oxide minerals are ilmenite and rutile found as needle-shaped inclusions enclosed by pyrite and pyrrhotite.

Quartz, dolomite and chlorite form the main gangue minerals.

Textural relations: The pyrite-pyrrhotite association shows clear replacement of pyrrhotite by pyrite. The replacing pyrite in some cases has assumed an idioblastic texture (Fig. 1). Occurrence of idioblasts of pyrite in dolomite and chlorite points out to the replacement of the latter by pyrite. Continuity of chlorite needles on either side of pyrite cubes also testifies to the above type of replacement. Pyrrhotite and magnetite mass clearly shows ' invasion ' and replacement by pyrite. Individual magnetite grains also are replaced by pyrite. Quartz is only partially replaced by pyrite.

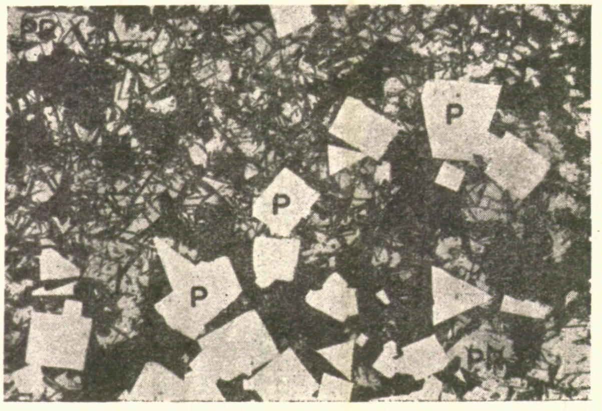

Figure 1. Idiomorphic pyrite (white) in pyrrhotite mass (grey). Black matrix is dolomite and chlorite.

Pyrrhotite exhibits replacement textures with pyrite and with magnetite. As mentioned above it is replaced by pyrite, and in its turn replaces magnetite in zones of shearing, during which process it is sometimes pseudomorphous after magnetite. Replacement of magnetite by pyrrhotite is more prominent in crushed zones where the larger magnetite grains are unaffected.

Magnetite suffered cataclastic effects as shown by micro-shear and micro-fold zones. These zones of crushing are characterized by the presence of pyrrhotite as small irregular shreds and platy individuals, aligned along certain directions and at some places by partial recrystallization of magnetite. Magnetite is extensively replaced by pyrrhotite (in zones of crushing) and also by pyrite as shown by irregular small nests of magnetite in both pyrrhotite and pyrite. Occurrence of crushed and recrystallized magnetite in association with perfectly zoned and uncrushed magnetite indicates the local nature of crushing.

Sphalerite exhibits typical replacement textures in association with chalcopyrite, ' caries ' texture (Fig. 2) and occurrence of small idioblasts of chalcopyrite in sphalerite, testifying to the replacement of sphalerite by chalcopyrite. Chalcopyrite is also exsolved from sphalerite along (111) planes. Galena is found to replace sphalerite slightly.

Dolomite, one of the three main gangue minerals is found to be replaced and enclosed by quartz with the development of an imperfect 'atoll' texture. Quartz is replaced by pyrite, sphalerite and galena.

Paragenesis: From the textural study of the mineral assemblage, the following sequence of events is indicated. Magnetite, ilmenite, rutile, dolomite and chlorite are attributed to the host rocks in the area. All these are definitely the earliest as indicated by the textures. Into the metabasic rock with the above minerals, the hydrothermal sulphide-bearing solutions made their entry. At this stage, their entry was preceded by mild tectonic action, which was perhaps local. During this activity magnetite was partly crushed and recrystallized; dolomite and chlorite were also subjected to crushing and shearing. From the hydrothermal solutions quartz got separated first, and it slightly replaced some dolomite crystals. Quartz was closely followed by pyrrhotite which took advantage of the weaker zones of shearing found in the host rock. During its emplacement and solidification,

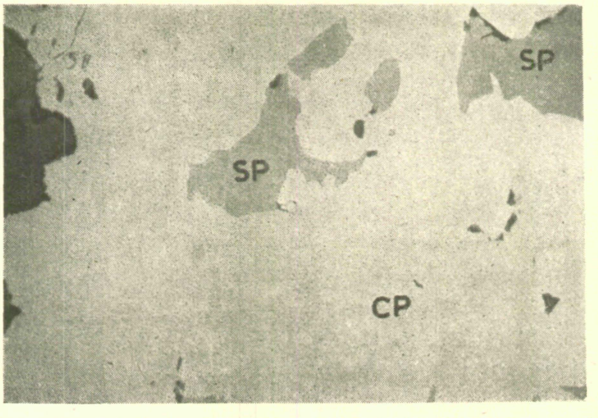

Figure 2. Sphalerite (dark grey) being replaced by chalcopyrite (white) with the development of 'caries' texture.

pyrrhotite replaced magnetite extensively especially in the zones of shearing, and to some extent dolomite and chlorite as well. Pyrrhotite was closely followed by pyrite which replaced magnetite of the magnetite-ilmenite-rutile assemblage on one hand and pyrrhotite on the other. Pyrite continued to form well beyond the crystallisation stage of pyrrhotite. The earlier phase of pyrite was formed under conditions somewhat disturbing, whereas the later phase of pyrite was formed under extremely quiet conditions which permitted the development of idiomorphic pyrite, as a result of slow replacement of pyrrhotite and magnetite. Pyrite was followed by sphalerite-chalcopyrite-galena assemblage. Of these three minerals sphalerite was the earliest and was replaced slightly by chalcopyrite. Sphalerite continued to form along with chalcopyrite. Finally, at the last stage, galena was formed.

Acknowledgements: The authors place on record their grateful thanks to Dr. B. P. Radhakrishna, Managing Director, Chitaldrug Copper Co., Mysore State, for giving facilities and permission to carry out the work in Ingladhal area and for kindly sparing some core samples. The ore sections were photographed in the laboratories of Martan, Hochschule, Leoben, Austria, and the authors are grateful to Prof. W. Siegel for his help in this direction, and for confirming the identity of the minerals. The authors thank Dr. M. S. Rao for his critical comments. One of us (K.V.S.) is grateful to the C.S.I.R. for granting a Research Fellowship during the tenure of these investigations, and the other (C.B.R.) to the Andhra University for financial assistance to carry out field work. The authors thank the Head of the Department of Geology for facilities and encouragement.

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ON THE NATURE AND PETROGENESIS OF DHANJORI LAVA NEAR RAKHA MINES, SINGHBHUM, BIHAR

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The Precambrian rocks of northern Singhbhum are associated with several phases of igneous activity that range in composition from the ultrabasic to the acid end. The most widespread basic activity among them is represented by the Dhanjori lava (and its possible equivalent—the Dalma lava, cf. Dunn and Dey, 1942, p. 440). Underlain by a layer of discontinuous patches of quartzite-conglomerate, the Dhanjori lava occurs immediately to the south of the Singhbhum shear zone and has distinct petrochemical characteristics. Tectonic and stratigraphic interpretations on the Precambrian formations of northern Singhbhum demand a critical study and remapping of these basic lavas, not only because of their little known genetic history but also because such studies would help in reconstructing the history of evolution of this structurally complex belt in Eastern India.

Petrography and mineralogy: Detailed study of a part of the lava country near Rakha Mines (from Jaduguda to Surda) reveals that the rocks can broadly be divided into two distinct types of epidiorite, as far as the relative dominance of relict and superimposed structures in them are considered. This subdivision is also supported by the nature of the contained amygdales and their differences in mineralogy.

The most wide-spread type is largely massive and preserves relict porphyritic and intergranular textures. Usually the plagioclase phenocrysts retain their