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METAMORPHISM OF CORDIERITE GNEISSES FROM EASTERN GHAT GRANULITE TERRAIN, ANDHRA PRADESH, SOUTH INDIA ; D.S.N. Murthy and S. Nirmal Charan National Geophysical Research Institute Hyderabad 500 007 India.

Cordierite-bearing metapelites of the Eastern Ghat granulite terrain occur in close association of Khondalites (Garnet-sillimanite gneisses), quartzites, calc-silicate rocks and charnockites. The present study is limited to the rocks occurring between Bobbili in the north and Guntur in the south of Andhra Pradesh.

Cordierite-garnet-biotite-sillimanite-quartz-ilmenite \pm spinel \pm plagioclase \pm hypersthene \pm K-feldspar \pm corundum \pm anthophyllite form the mineral assemblage of these rocks. The association of the mineral and their textural relationship suggest the following metamorphic reactions: (i) Garnet + sillimanite + quartz = cordierite, (ii) hypersthene + sillimanite + quartz = cordierite, (iii) hypersthene + sillimanite + quartz = cordierite, (iii) sillimanite + spinel = cordierite + corundum, and (iv) biotite + quartz + sillimanite = cordierite + K-feldspar. Generally the minerals are not chemically zoned except garnet-biotite showing zoning when they come in close contact with one another.

The potential thermometers are provided by the Fe-Mg distribution of coexisting biotite-garnet and cordierite-garnet. Temperature of $750^{\circ} \pm 50^{\circ}$ is estimated based on garnet-biotite geothermometry^{1,2,3}. The temperature estimated from the cordierite-garnet thermometry^{1,4} is $730^{\circ} \pm 60^{\circ}$ C.

Conflicting interpretation of the P/T dependence of these reactions involving cordierite are due to H_2O in the cordierite. The estimates of H_2O in cordierite are made⁵ and pressure estimated at $P_{H_2O} = 0$ is 5.3 ± 0.2 Kb, while $P_{H_2O} = P_{Total}$ the maximum pressure

obtained for the cordierite gneisses is 7.0 ± 0.3 Kb. The positive optic axis measured in cordierite of these rocks is indicative of participation of P_{CO_2} in the metamorphic equation⁶ suggesting the $P_{H_2O} < P_{Total}$. The presence of alkali feldspar-quartz assemblage which is common in these gneisses will be constrained from melting only if H_2O activity is less than 0.5. The piezometric array inferred is convex towards the temperature array, indicating a rapid and isothermal crustal uplift probably aided by thrust tectonics.

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