

## **Disequilibrium texture and compositional relation of Ca-amphiboles in metagabbro near Tsundupalle Greenstone Belt: implications for fluid aided reactions**

Manoshi Hazra (), Jinia Nandy (), and Upama Dutta ()

(1) IIT(ISM) Dhanbad, Dhanbad, India (manoshi43hazra@gmail.com), (2) IIT(ISM) Dhanbad, Dhanbad, India (jinia.nandy@gmail.com), (3) IIT(ISM) Dhanbad, Dhanbad, India (upamadutta@gmail.com)

Metamorphosed gabbro from Tsundupalle greenstone belt, Eastern Dharwar Craton contain clinopyroxene (Cpx) and plagioclase (Pl) as primary minerals. In most cases, clinopyroxene in the metagabbro is pseudomorphed by amphibole, rare cases relict clinopyroxene occurs within its core. Plagioclase is highly altered and contains inclusions of secondary minerals in it. A blue green amphibole is found rimming the pseudomorph and plagioclase contact. EPMA analysis confirms three broad compositional varieties for amphibole, namely actinolite (Act), ferrohornblende (F.Hbl) and tschermakite (Tsch). Microscopic observation combined with BSE images reveal the mutual relation between the amphiboles precisely. Pseudomorph of clinopyroxene is dominated by randomly oriented actinolite grains whereas patches of ferrohornblende are found replacing actinolite and clinopyroxene (when present). Tschermakite is found in contact with plagioclase. It forms a rim at the boundary between plagioclase and actinolite/relict clinopyroxene. Large ferrohornblende and tschermakite grains are also found in these rocks where the latter amphibole is seen replacing the former. This feature along with replacement of actinolite by ferrohornblende, tschermakite (near plagioclase) indicate that actinolite was the first amphibole to form, followed by ferrohornblende. Tschermakite appeared at the last stage of amphibolitization. Replacement/reaction textures between amphiboles clearly represent disequilibrium relation. The different calcic amphiboles in the rock formed as a result of thermodynamic incompatibility of earlier compositions rather than miscibility gap. Depending on the mutual relations between the different phases following reactions can be drawn: a)  $Cpx + H_2O = Act$ ; 2)  $Cpx / Act \pm H_2O = F.Hbl$ ; 3)  $Cpx / Act + Pl \pm H_2O = Tsch$ . Formation of amphibole from pyroxene clearly illustrates an open system. Graphical representations indicate coexisting actinolite and hornblende conversion mainly involved edenitic and tschermakitic substitutions. Preliminary analysis with tschermakite and plagioclase composition indicates a P-T condition of  $\sim 6-7$  kbar and  $650-750^\circ C$ . Preservation of delicate features (pseudomorph, reaction rim) in the rock indicate no significant deformation occurred after the subsolidus changes took place. In the field, the rock is associated with an evolved leucogranitoid body. Interestingly, pyroxene as a relict mineral, is only present in the outcrop away from the leucogranitoid body whereas amphibole proportion is much higher in the metagabbro at the contact. Therefore the leucogranitoid can be a probable source for fluid that triggered amphibolitization in the rocks.

Keywords: metagabbro, disequilibrium texture, fluid, Eastern Dharwar craton, pseudomorph.