RETROGRADE PYROXENES IN CHARNOCKITICGNEISSES IN THE ARCHEAN LIMPOPO NORTHERNMARGINAL ZONE, ZIMBABWE

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Dehydration reaction of hornblende;Hbl + Qtz = Opx + Cpx + Pl + water isoften frozen in pyroxene-bearingquartzofeldspathic gneisses (charnockiteand enderbite) in the Archean high-grade Limpopo Northern Marginal Zone (NMZ), Zimbabwe. Textural relation ship sevidently reveal that the reaction tookplace after the peak metamorphism, probably at the time of uplifting. Microthermometric data of fluidinclusions in quartz associated with theassemblages show that the inclusions arecompositionally grouped into threetypes; type 1 for H2O-rich fluid withlow salinity, type 2 for H2O-rich fluidwith high salinity, and type 3 forCO2-rich fluid with low salinity. Onthe basis of isochores estimated fromthem, type 1 appears to result fromdecreasing fluid pressure (Pf) againstrock pressure (Ps). The salinity oftype 2 reaches 20 wt% NaCl equivalent,suggesting infiltration of high salinefluid. Such fluid may also beresponsible for the dehydration at lowertemperatures. Type 3 with very lowdensity is likely to be formed at ashallower trapping condition. Consequently it is notable thatformation of the charnockitic rocks inthe NMZ is related to the fluid witheither low saline at Pf Ps or highsaline at Pf = Ps, or both. Theequilibrium temperature of thedehydration reaction, calculated fromthe activity-composition relation ofcoexisting minerals, exceeds theretrograde conditions at whichhornblende is decomposed to pyroxenes,provided that Pf = Ps. It is concludedin either case that the Pf Ps isnecessary for the dehydration in thepresent rocks.