

FLUID INCLUSION STUDY OF RADIOACTIVE GRANITOIDS AND CHERTY CATACLASITE IN THE SOUTHEASTERN PART OF NANDED DISTRICT, MAHARASHTRA: IMPLICATIONS FOR URANIUM MINERALISATION

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Abstract

Radioactive granitoids and cherty cataclasites are delineated in Thadisaoli–Khatgaon and Shahpur–Sujayapur sectors in southeastern part of Nanded district, Maharashtra, which have recorded anomalous radioelemental contents (Granites: upto 1% U_3O_8 and 0.20% ThO_2 ; Cherty cataclasites upto 0.11% U_3O_8 and <0.005% ThO_2) and enrichment in trace element and rare metal and rare earth element concentration (Nb: upto 146ppm, Y: upto 226ppm, Zr: upto 559ppm and total REE: upto 2010ppm). The mineralised granitoids are affected by profuse pegmatitic/quartzo-feldspathic, quartz and epidote venations and mainly confined along the NE–SW and NNE–SSW faults/shear zones. Radioactive phases are represented by discrete uranium/thorium ore minerals (uraninite, β -uranophane and thorite) and high content of resistates viz., apatite, zircon, allanite, sphene, cerianite, monazite and ilmenite.

Fluid inclusion studies of the mineralised and sheared granites, quartzo-feldspathic veins (QFV's) and quartz veins indicate the presence of 6 to 32 μ m size aqueous and carbonic inclusions of three principle types and represented by six phases viz., aqueous mono-, bi- and poly-phases, aqueous-carbonic, carbonic mono-, bi- and poly-phases. Aqueous biphasic inclusions show wide range of salinity (0.71 to 19.99 wt.% eNaCl) and homogenisation temperatures (T_h : 127.5–280.8°C), while aqueous-carbonic inclusions exhibit restricted salinity (5–8.4 wt.% eNaCl) and T_h (28.3–30.9°C). The composition of these aqueous fluids varies from NaCl–KCl dominant in quartz veins and radioactive granite to $MgCl_2$ dominant in sheared radioactive granite. Similarly, co-eval aqueous biphasic and aqueous-carbonic inclusions have yielded 678–958 bar pressure and 201–233°C temperature in quartz vein samples while higher values of 1120–1550 bar and 304–360°C are indicated by sheared granite. The presence of more than one population without much change in fluid composition signifies their origin at different stages of deformation. Besides, mixing of a moderate temperature and low salinity fluid (meteoric/basinal brine) with a comparatively high temperature and hypersaline fluid (magmatic/evolved brine) might have also played an important role in inclusion characteristics. Based on these fluid inclusion characteristics, it appears that multi-episodic hydrothermal activity under an extensional tectonic regime in this fertile granitic province has led to precipitation of uranium along suitable structural aureoles from uraniumiferous hydrotherms.

Keywords: Granites, Uranium mineralisation, Fluid inclusion, Microthermometry, Nanded district.