

Fluor-apatites from calc-silicate skarn vein contacts, Gondivalsa, Orissa, India

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FLUOR-APATITES FROM CALC-SILICATE SKARN VEIN CONTACTS, GONDIVALSA,

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The frequent occurrence of metasomajic skarn veins in the limestones around Gondivalsa, Orissa, India (Long 82°59'E; Lat. 18°24'39"N) has been described (Rao and Rao, 1970). The limestones are associated with garnet sillimanite gneisses, quartzites, garnet quartzites and calc-granulites of the Khondalite group in the Eastern Ghats of India. The skarn veins generally vary in length from 1.5 to 9 m and in width from 2 to 25 cm. Along the margins of the skarn veins the calcite recrystallized to coarse crystals occasionally rich in coarse flakey graphite. Pessinite and basic plagioclase are the essential minerals in the skarn veins. Near the immediate contacts of the skarn minerals and the coarse calcites, is a very narrow zone containing phlogopite, pyrrhotite and granular aggregates of apatite sometimes with well formed crystals as much as 2.5 x 1.5 cm embedded in the coarse calcite crystals. These crystals have density 5.205 ± 0.002 g/cm³; $\rho = 1.6451$; $\epsilon = 1.6391$ both ± 0.005 ; $n = 9.410 \pm 0.002$; $\mu = 6.980 \pm 0.005$ Å; volume 527.6 Å³. The chemical analyses of two fluor-apatites and a coexisting phlogopite were determined in order to apply the fluorine-hydroxyl exchange geothermometer in coexisting apatite and biotite (Stormer and Garmichael, 1971). The temperature obtained from Table 1 was 400°C but a higher value of 958°C is obtained for the same pair based on Indington's (1976) biotite-apatite geothermometer without considering the amite and siderophyllite proportions in the mica as it is Mg rich phlogopite. The temperature range covers the 600°C obtained (Rao and Rao, 1976) from the stability of phlogopite-calcite-quartz mineral assemblages (Hewitt, 1975).

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Table 1. Chemical analyses of fluor-apatites and coexisting phlogopite

	Ions per 26 or 24 (O, OH, F, Cl)					
	1	2	3	1	2	3
SiO ₂	tr.	tr.	40.98	Si	-	5.670
TiO ₂	-	-	0.08	Al	-	2.330
Al ₂ O ₃	-	-	17.93	Al	-	0.390
Fe ₂ O ₃	-	-	0.12	Ti	-	0.008
FeO	-	-	0.38	Fe ³⁺	-	0.012
MgO	-	-	25.71	Fe ²⁺	-	0.043
CaO	54.78	54.96	0.10	Mg	-	5.340
P ₂ O ₅	42.04	42.10	-	Ca	9.87	9.88
Na ₂ O	-	-	0.11	Na	-	0.030
K ₂ O	-	-	9.78	K	-	1.730
F	3.65	3.74	2.90	F	5.97	5.97
Cl	0.34	0.11	0.29	F	1.94	1.98
H ₂ O ⁺	0.24	0.30	2.70	Cl	0.09	0.03
H ₂ O ⁻	0.05	0.07	0.10	OH	0.27	0.33
				F/F+OH	0.87	0.86
O ≡ F, Cl	101.10	101.29	101.18			0.34
	1.61	1.59	1.26			
	99.49	99.70	99.92			

Trace elements in p.p.m.: (Average of 5 fluor-apatites):

1. Pale yellowish-green fluor-apatite.
2. Pale bluish fluor-apatite.
3. Colourless phlogopite.