

Fluorian allanite from calc-granulite and pegmatite contacts at Garividi, Andhra Pradesh, India

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SYNOPSIS

CALC-GRANULITES at Garividi are intruded by microcline granites and pegmatites. At the contacts fluorapatite, fluorian allanite, ferroan sahlite, and epidote occur; rarely, the epidote is associated with

a partly metamict allanite, an analysis of which is given, also X-ray data for the unheated and heated mineral.

FLUORIAN ALLANITE FROM CALC-GRANULITE AND PEGMATITE CONTACTS AT GARIVIDI, ANDHRA PRADESH, INDIA.

Allanites from charnockites of Visakhapatnam and Kondapalli, Andhra Pradesh, India were described (Rao and Babu 1978; Rao 1978). Recent investigations around Garividi (Long. 83° 32'28" E; Lat. 18° 16'38" N) have revealed the presence of fluorian allanite and fluor-apatite along the contacts of calc-granulites and microcline pegmatites. The calc-granulites are part of the khondalites consisting of garnet-sillimanite gneisses and quartzites. These are intruded by microcline granites and pegmatites and gave rise to metasomatic ferroan sahlite, epidote and actinolite minerals along the intrusive contacts (Rao and Rao 1971). Metamict allanite is rarely associated with epidote at the calc-granulite and pegmatite contacts. Apatite is a ubiquitous accessory in the contact zones. Emission spectrographic analysis of F in apatite, actinolite and allanite gave 3.5%, 1.5% and >1% F respectively including allanite from Kondapalli (Rao 1978) and Kasipatnam (Rao 1976).

The data (Tables 1 and 2) are similar to earlier reported allanites from the Eastern Ghats. Biotites and amphiboles from Kondapalli in the charnockites also contain high fluorine (Iselanandam 1970) and as hornblende and biotite rims granulated pyroxenes and grew along the pyroxene cleavages, their development was fairly late in the metamorphic and tectonic history. The allanite in the NW-SE apatite-magnetite filled fractures which are parallel to cross-fold axial traces are 2 900 m.y. old (Vinogradov and Tugarinov 1964) and perhaps this was the time of general fluorine enrichment in this province.

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TABLE-1

Chemical analysis of fluorian allanite from Garividi, Andhra Pradesh, India.

Oxides	Wt %	Number of ions on the basis of 13(O, OH, F)
SiO ₂	31.02	Si = 2.9255
TiO ₂	1.77	Al = 0.0745
Al ₂ O ₃	13.28	Al = 1.3967
Fe ₂ O ₃	5.62	Fe ³⁺ = 0.3961
FeO	9.56	
MgO	1.03	Mg = 0.1454
MnO	0.22	Tl = 0.1301
CaO	9.88	Fe ²⁺ = 0.7526
SrO	0.04	Zr = 0.0057
Ce ₂ O ₃	15.80	Mn = 0.0170
La ₂ O ₃	6.06	Y = 0.0102
Nd ₂ O ₃	2.93	Ca = 1.0016
Y ₂ O ₃	0.21	Th = 0.0096
ZrO ₂	0.10	Ce = 0.5455
ThO ₂	0.45	La = 0.2105
U ₃ O ₈	0.02	Na = 0.0985
V ₂ O ₅	0.10	U = 0.0003
PbO	0.05	V = 0.0079
H ₂ O ⁺	1.75	Sr = 0.0023
H ₂ O ⁻	0.03	Pb = 0.0011
F	1.10	OH = 1.1000
Cl	0.13	F = 0.3282
		Cl = 0.0113
	101.05	
O = F, Cl	0.49	
	100.56	

TABLE-2

X-ray diffraction data (Cu-K α radiation) of fluorian allanite from Garividi, Andhra Pradesh, India.

d α°	Unheated		Heated		hkl
	d α°	I/I ₀	d α°	I/I ₀	
	4.60	1/2	4.60	002	
	3.67	2	3.67	111	
	3.41	1	3.41	102	
3.51	2	3.50	1	211	
		3.33	1	210	
		3.23	4	201	
2.96	10	2.92	10	113	
		2.86	3	020	
		2.79	2	211	
		2.70	1	021	
		2.68	2	300	
		2.63	1	311	
		2.54	2	202	
2.50	3	2.48	3	121	
		2.40	2	022	
		2.32	1/2	004	
		2.30	1	222	
2.19	1	2.17	1/2	122	
2.16	4	2.13	2	014	
		2.06	3	023	
1.99	1/2	1.97	2	400	
		1.98	1	222	
		1.78	2	322	
1.62	1/2	1.62	1	124	
1.60	1	1.58	1/2	115	