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PYROXFERROITE – A RARE Fe-Mn PYROXENOID FROM GARBHAM, VIZIANAGARAM MANGANESE BELT, ANDHRA PRADESH

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Abstract

Pyroxferroite, (Fe, Mn, Ca) SiO_3, the rare manganiferous pyroxenoid, has been identified in manganese silicate - carbonate rock from the Vizianagaram manganese belt, Andhra Pradesh. Optical data and chemistry of the mineral have been presented and is compared to other occurrences.

Introduction

Manganese silicate-carbonate rock (queluzite), a product of regional metamorphism of impure manganiferous sediment, has been recorded in the Vizianagaram manganese belt, Eastern Ghats, Andhra Pradesh (Krishna Rao *et al* 1981). These rocks occur as conformable bands in close proximity to the manganese ore bodies and other associated litho-units like quartzite, calc-silicate rock and khondalite.

A rare manganese pyroxenoid, pyroxferroite, has been identified in the manganese silicate-carbonate rock from the Garbham (18°22' : 83°27') area of the Mn-belt. This mineral is present in a very low proportion (about 1%) in the rock and its characteristics are described in this note.

Petrography and Mineralogy

The manganese silicate-carbonate rock is constituted essentially of knebelite, Mn-ferrosalite, rhodonite and bustamite with accessories including rhodochrosite. The rock is medium to coarse grained showing granoblastic texture with equant polygonal grains having Y-shaped mutual grain boundaries. Pyroxferroite appears colourless to pale yellowish with one set of prismatic cleavage having idioblastic grain habit. The extinction angle w.r.t. prismatic cleavage is variable between 5° and 20°. Optic axial angle (2Vz) is moderately low (30° – 40°) and optically always positive.

Chemistry

The major element chemistry of the mineral has been obtained through microprobe analysis carried out by Prof. D. Ackermand at Kiel University, W. Germany using a wavelength dispersive microprobe (Siemens Elmisonde) equipped with two fully focussed spectrometers. The chemical data together with number of ions and end member proportions are presented in Table I.

Discussion

The mineral pyroxferroite was first described from Lunar microgabbros and breccias from Tranquility Base (Chao *et al* 1970; Agrell *et al* 1970). Following the discovery of the natural occurrence of pyroxferroite, Chao *et al* (1970) established that there is a series with varying proportions of Mn and Fe. The members of the series with Mn < Fe are pyroxferroites, while those with Mn > Fe are pyroxmangites.

Chao *et al* (1970) pointed out that terrestrial pyroxferroites were already reported from Sweden (Sundius, 1931) and Finland (Hietanen, 1938) but were described as 'sobralite' and 'dark-brown pyroxmangite respectively. $MnSiO_3$ and $FeSiO_3$

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TABLE I. Chemical composition of pyroxferroite.

	1	2	3	4	5
SiO_2	42.80	46.51	45.74	46.48	46.53
TiO_2	—	—	—	—	—
Al_2O_3	—	—	tr	—	0.21
Cr_2O_3	—	—	—	—	—
Fe_2O_3	—	—	tr	2.37	0.85
FeO	25.84	29.04	0.39	22.32	24.69
MnO	14.38	15.63	52.42	21.09	20.50
MgO	0.97	1.57	0.68	3.11	1.39
CaO	0.95	1.10	0.46	4.64	5.46
K_2O	—	—	0 05	—	—
Na_2O	—	—		—	—
Total	84.94	93.85	99.74	100.01	99.71

No. of ions on the basis of 10(0) for the analyses 1 and 2 and on the basis of 18(0) for the analyses 3, 4 and 5.

Si	3.5126	3.4695	5.976	5.901	5.967
Ti	—	—	—	—	—
Al	—	—	—	—	0.032
Cr	—	—	—	—	—
Fe^{3+}	—	—	—	0.226	0.082
Fe^{2+}	1.7731	1.8112	0.042	2.370	2.648
Mn	0.9995	0.9975	5.803	2.268	2.228
Mg	0.1166	0.1745	0 132	0.590	0.265
Ca	—	—	—	—	—
Na	—	—	—	—	—
		Molecular Ratio			
$FeSiO_3$	59.64	59.06	0.06	42.62	45.65
$MnSiO_3$	33.62	32.53	95.92	37.24	37.25
$MgSiO_3$	3.92	5.69	2.18	9.38	4.43
$CaSiO_3$	2.81	2.85	1.06	10.36	12.54

1 and 2: Present Sample.

3: Rose pink pyroxmangite, Ajiromine, Japan (Lee, 1955).

4: Dark-browu pyroxmangite, Lapua SW Finland (Hietanen, 1938).

5: Yellowish red brown 'Sobralite'. Vester Silvberg, Sweden (Sundius, 1931).

molecular proportions of pyroxferroite of the present locality as well as from Sweden and Finland along with those of pyroxmangite from Japan (Lee, 1955) are plotted against $CaSiO_3$ following the diagram of Momoi (1964). Fig. 1 shows all plots falling in the pyroxmangite field with plots for pyroxferroite towards the Fe-end and that for pyroxmangite towards the Mn-end.

The presence of pyroxferroite is consistent with earlier findings of Fe-rich phases like knebelite, jacobsite, manganoan ferrosalite from similar Mn-silicate

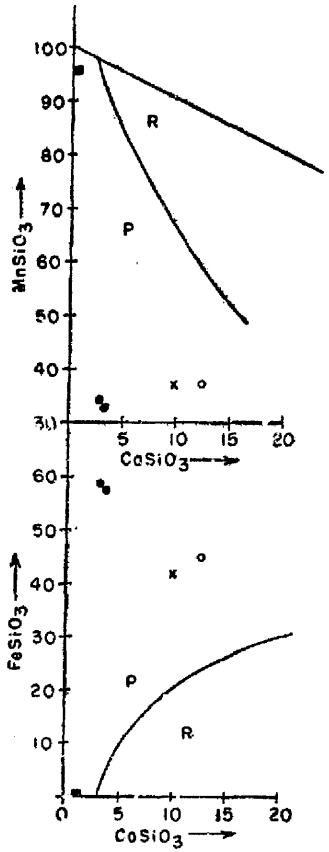

FIG. 1.

SHOWING SEPARATE FIELDS FOR PYROXMANGITE AND RHODONITE WITH RESPECT TO $MnSiO_3$, $FeSiO_3$ & $CaSiO_3$ MOLECULAR PROPORTIONS (AFTER MOMOI, 1964).

P & R-DENOTE FIELDS FOR PYROXMANGITE AND RHODONITE RESPECTIVELY

• PLOTS FOR TWO ANALYSES OF PYROXFEROITE OF SAMPLE No. TBH. 3/1 (LOCATION: GARBHAM, VIZIANAGARAM DIST., A.P., INDIA)

■ ROSE PINK PYROXMANGITE, AJIRO MINE, HONSHU, JAPAN (LEE 1955).

o YELLOWISH RED BROWN 'SOBRALITE' (=CALCIAN MANGANOAN PYROXFERROITE), VESTER SILVERG, DALECARLIA, SWEDEN (SUNDIUS, 1931)

× DARK BROWN 'PYROXMANGITE' (=CALCIAN MANGANOAN PYROXFERROITE), QUARTZITE, SIMSIO, LAPUA, FINLAND (HIETANEN, 1938).

rocks of the area and is indicative of the presence of iron in appreciable amount in the impure manganiferous sediment.

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