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NEWS AND NOTES

Nb-bearing Minerals in Siriwasan Carbonatite, Chhota Udaipur, Gujarat, India

Shrinivas G. Viladkar, Carbonatite Research Centre, Amba Dongar, Kadipani, Gujarat - 391 175, India
Present address: Department of Earth and Environmental Science, IISER, Bhopal, Bhopal - 462 066, India
E-mail: *sviladkar@gmail.com*

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The Siriwasan carbonatite sill intruding into Cretaceous Bagh sedimentary sequence and overlain by thin flow of Deccan Basalt, is part of the Chhota Udaipur carbonatite province, in the westernmost periphery of the Deccan volcanic region. The complex is situated north of Amba Dongar diatreme. Penetration of carbonatite into Bagh sandstone has resulted in the formation of a carbonatite breccia that occur as a sill that extends for 11 kms. Sövite occurs as small and large plugs within the carbonatite breccia. Mineralogically sövites exhibit wide variation. Among the silicate minerals, aegirine, sodic-amphibole and biotite are predominant while the accessories include pyrochlore, perovskite, sphene, Nb-zirconolite, fluorite and REE-minerals such as monazite and bastnäsite. Occasionally pyrochlore and perovskite form pools surrounded by calcite while sphene occurs a disseminated grains. Nb-zirconolite occur as small subrounded grained in some thin sections. Similar variation in mineralogy is seen in the cementing calcite of the carbonatite breccia. The only difference is the higher percentage of ankerite in the matrix of carbonatite breccia.

This short note reports Nb-bearing minerals such as pyrochlore, Nb-zirconolite, perovskite and sphene for the first time from this carbonatite (Tables 1and 2).

Compared to the pyrochlore from the neighbouring Amba Dongar complex, pyrochlore grains from Siriwasan are very fresh with no sign of secondary alteration or reaction with hydrothermal fluids. Siriwasan pyrochlore has retained the primary nature and is homogeneous in appearance and composition. It shows high Na ~7.0%, high F ~4.0% and high Nb ~65.0%. Perovskite is much more abundant in Siriwasan as compared to Amba Dongar. Niobian Zirconolite occurs as tiny grains both in Amba Dongar and Siriwasan.

Table 1. Representative analyses of pyrochlore from sövites of Siriwasan

Nb_2O_5	64.57	64.32	61.71	La	0.003	0.007	0.000
Ta_2O_5	2.66	2.84	n.d.	Ce	0.005	0.005	0.035
TiO_2	2.92	3.4	6.46	Nd	0.002	0.002	0.000
ZrO_2	n.d.	n.d.	4.11	U	0.086	0.086	0.000
ThO_2	0.37	0.37	1.02	Th	0.005	0.005	0.013
UO_2	6.59	6.66	n.d.	Na	0.794	0.729	0.666
La_2O_3	0.12	0.34	n.d.	Ca	0.840	0.838	1.087
Ce_2O_3	0.25	0.22	1.68	Mn	0.000	0.000	0.000
CaO	13.37	13.41	17.63	**A**	1.735	1.673	1.802
Fe_2O_3	2.66	2.5	n.d.	Ti	0.129	0.149	0.280
SrO	n.d.	n.d.	n.d.	Nb	1.711	1.696	1.605
BaO	n.d.	n.d.	n.d.	Ta	0.042	0.045	0.000
PbO	n.d.	n.d.	n.d.	Al	0.000	0.000	0.000
Na2O	6.99	6.45	5.97	Cr	0.000	0.000	0.000
F	3.05	3.67	4.14	Si	0.000	0.000	0.000
O=F	1.281	1.5414	1.7388	Zr	0.000	0.000	0.115
Total	**103.66**	**104.26**	**102.72**	Fe	0.118	0.110	0.000
				F	0.565	0.677	0.753
				O	6.252	6.222	6.302
				B=2	0.284	0.285	0.289

n.d. - Not detected; Analyzed in McGill University, Montreal Canada

Table 2. Perovskite and Sphene from Siriwasan Carbonatite

	Siriwasan Perovskite			Sphene		
SiO_2	0.02	0.03		29.56	29.77	29.29
TiO_2	15.00	15.30		37.31	37.83	35.31
Al_2O_3	0.01	0.01		0.14	0.07	0.17
Cr_2O_3	0.00	0.05		0.00	0.01	0.00
Fe_2O_3	0.00	0.00		0.00	0.00	0.00
FeO	0.10	0.12		0.66	0.30	1.05
MnO	0.05	0.05		0.05	0.06	0.00
MgO	0.00	0.00		0.00	0.00	0.00
CaO	19.40	19.50		26.25	25.78	25.96
Na_2O	5.78	5.80		1.01	1.22	0.86
K_2O	0.00	0.00		0.00	0.00	0.00
Nb_2O_5	58.90	59.00		3.42	3.43	3.71
Total	**99.26**	**99.86**		**98.40**	**98.47**	**96.35**
Na	0.290	0.289	Si	3.97	3.98	4.02
Ca	0.539	0.538	Al	0.02	0.01	0.03
A	0.829	0.827	Ti	3.77	3.81	3.65
Ti	0.292	0.296	Cr	0.00	0.00	0.00
Nb	0.690	0.687	Fe3	0.00	0.00	0.00
Al	0.000	0.000	Mg	0.00	0.00	0.00
Si	0.001	0.001	Fe2	0.07	0.03	0.12
Mn	0.001	0.001	Mn	0.01	0.01	0.00
Fe	0.002	0.003	Na	0.26	0.32	0.23
Cr	0.000	0.001	Ca	3.77	3.69	3.82
B	0.987	0.989	K	0.00	0.00	0.00
O=3	0.642	0.647	Sum_cats	11.87	11.85	11.86

Electron microprobe analyses were conducted at McGill University, Montreal, Canada

Mitchell (2005) has shown that pyrochlore, perovskite and Nb-bearing titanite are commonly found in carbonatites of East Africa. Moreover, experimental studies carried out by Mitchell and Kjarsgaard (2002 and 2004) suggest that pyrochlore and perovskite can crystallize early from carbonatite magma. This is in confirmation with experimental results of Jago and Gittins (1993) and according to them fluorite is essential for crystallization of pyrochlore as primary mineral.

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