

ON THE COMPOSITION OF BARYTO-CELESTITES.

BY DR. C. W. VOLNEY.

During an examination of minerals, containing barium and strontium, with the view of ascertaining their economical value, I found some interesting coincidences between the results of former observations and my own.

In the silurian limestones of Canada, especially in those of the eastern part of the Province of Ontario, occur considerable deposits of barites and celestites, and although I found some barites of remarkable purity, the greater part of the celestites which came under my observation contain admixtures of barium sulphates in such quantity and regularity that they can hardly be considered accidental.

The barites proper agree in composition and forms of crystallization with those already described. The following gives the analytical results of barites from the County of Renfrew :

H ₂ O	0,0040
Ba SO ₄	98,3000
Sr SO ₄	0,0435
Ca SO ₄	0,0104
Al ₂ O ₃	0,0015
Fe ₂ O ₃	0,0190
Si O ₂ (insoluble)	0,0075
“ (soluble)	0,0020
	<hr/> 98,3879

This mineral occurs in solid, white and opaque crystalline masses, with hardly a tinge of coloring in any part of it; orthorhombic, and of rather a tabular character.

The minerals, which were forwarded to me as celestites, were of a fibrous and radiated character, white, opaque, orthorhombic and brittle. Of two samples from deposits in the Counties of Renfrew

and Lanark, the following shows the analytical results; the differences in these two as well as in other cases, are so slight, that they may be safely ascribed to accidents in the analytical work and not to any differences in composition :

H ₂ O.....	0,200
Ba SO ₄	39,850
Sr SO ₄	58,200
Al ₂ O ₃ } Fe ₂ O ₃ }	0,100
Ca O.....	0,072
Si O ₂ (insoluble).....	0,350
“ (soluble).....	0,150
	<hr/>
	98,928

For the purpose of comparing the composition of these minerals with celestites proper from the same localities, I procured a specimen from Frontenac County. This agrees perfectly with the descriptions of the mineral; it is transparent, orthorombic and tabular and considerably harder and less brittle than the above described specimens from Renfrew and Lanark, of the fibrous and radiated character.

An analysis afforded :

H ₂ O.....	0,1500
Sr SO ₄	96,0000
Ba SO ₄	3,7000
Si O ₂ (insoluble).....	0,0930
“ (soluble).....	0,0670
Al ₂ O ₃	0,0430
Fe ₂ O ₃	0,0570
Mg O.....	0,0025
	<hr/>
	100,1125

The mineral gave none of the reactions of lime.

It may be considered as a representative of celestite proper.

Dana¹ notes the occurrence of minerals, which correspond in

¹System of Mineralogy, 5th ed., 1873; p. 620.

their composition with those from Renfrew and Lanark ; Thompson terms these baryto-celestites and Hugard gives for the angle $i \wedge i = 103\frac{1}{2}^\circ$, intermediate between barite and celestite. The mineral analyzed by Thompson came from Drummond Island, Lake Erie, and gave him 61.63 Sr SO₄ and 35.11 Ba SO₄. Dana says (l. c.) that this analysis needs confirmation. I have, so far, not succeeded in obtaining the mineral from Drummond Island, but the minerals from Renfrew and Lanark seem to confirm Thompson's results and, at all events, justify the terminology, and should be called baryto-celestites.

I will state, in conclusion, that all these minerals were analysed in the following manner : 2 grms. finely pulverized, were first heated in an air bath to a temperature between 150-180°, to ascertain the quantity of water, the remnant melted with potassium-sodium carbonate in the usual way and the mass treated with boiling water. The resulting solution of alkaline sulphates served for determination of the sulphuric acid of the mineral. The earthy carbonates dissolved in hydrochloric acid and precipitated with sulphuric acid, gave the alkaline earth *as* sulphates, and these were treated with an ammoniacal solution of ammonium carbonate, to separate barium from strontium and calcium. As a means of control, I have, in some cases, determined barium by precipitating it from the solution of the alkaline earths in hydrochloric acid by hydrofluosilicic acid ; it served to ascertain if the change of strontium and calcium sulphates into carbonates had been perfect.

New York, December 21, 1891.