

ART. VII.—*Synthesis of the minerals Crocoite and Phænicochroite*; by C. LUDEKING, Ph.D.

THE synthesis of Crocoite and Phænicochroite may be accomplished by exposing for several months to the air a solution of lead chromate in caustic potash in a flat dish or plate. It is possible thus to obtain a mixture of the crystals of the two. Without any difficulty whatever the individual crystals can be picked out separately by means of a pincette and obtained in a state for analysis.

The following are the analytical results obtained :

	Found.	Calculated.
<i>Crocoite.</i>	Pb 63.9	64.04 +
	CrO <sub>4</sub> 35.2	35.96 —
	<hr/>	<hr/>
	99.1	100.00
	Found.	Calculated.
<i>Phænicochroite.</i>	Pb 71.2	71.43 —
	CrO <sub>4</sub> 25.9	26.73 +

It appears therefore from this showing that the chemical composition of the artificial crystals approximates quite closely

to the calculated values. Rather strong solutions of caustic potash should be used and much precipitated lead chromate dissolved.

The crystals obtained are rather small, but can readily be studied by means of a lens, or better, a microscope. They show many modifications of the primitive form, as do also the natural crystals.

I was able to obtain by the same method crystals of  $(2\text{PbO})(\text{H}_2\text{O})$ , by exposing to the air for several months a saturated solution of litharge in caustic potash.\*

It was intended to produce by this means cerussite. The reaction is of course quite clear. The carbon dioxide of the air acting upon the alkali converts it into carbonate which is not a solvent for  $\text{PbO}$ . Consequently this latter very slowly separates out as a crystalline hydrate, being slightly soluble itself, a necessary condition for crystallization.

So likewise the solution of  $\text{PbCrO}_4$  in  $\text{KOH}$  on exposure to the air yielded crystals of crocoite and of phænicochroite. The formation of the former is due simply to the slow abstraction of the solvent by the carbon dioxide of the air. The formation of the latter, the phænicochroite, is on the contrary effected by another reaction, a portion of the chromic acid being appropriated by the  $\text{KOH}$ . The lead being thus deprived of the normal quantity of chromic acid, a basic compound, phænicochroite, is formed.

On reflection it seemed that it might be possible to obtain each of these minerals alone instead of in mixture as above.

By using a large excess of very strong solution of  $\text{KOH}$ , phænicochroite only was formed, or rather only very little crocoite. When on the contrary much  $\text{PbCrO}_4$  is dissolved and in addition  $\text{K}_2\text{CrO}_4$  is added to the  $\text{KOH}$  solution, crocoite alone is formed. I need not enter upon an explanation of these phenomena as they are almost self-evident. I shall now briefly describe the minerals obtained.

The  $\text{PbCrO}_4$  crystals are oblique rhombic prisms with many modifications. The fracture is uncertain; luster adamantine; color hyacinth-red. They are stable in the air. The phænicochroite crystals are tabular, of resinous luster, of cochineal color and appear to be orthorhombic. They, like the natural crystals have but little stability and soon change to a light yellow powder on exposure.

At Beresowsk, crocoite and phænicochroite are associated. It is not impossible that they were formed also by the action of the carbon dioxide of the air upon an alkaline solution of  $\text{PbCrO}_4$ , as in my first experiment.

\* Amer. Chem. Journ., vol. xiii, p. 120.