

method, 0.652 gram barium sulphate, or 0.0895 gram sulphur = 17.87 per cent.

	Theory.	Found.
Sulphur.....	18.28	17.87

Lithium Benzenesulphonate, $C_6H_5SO_3Li$.—This salt was prepared in the same way as the sodium salt, lithium carbonate being used. It crystallizes in stellate groups of delicate, white, anhydrous needles. It melts at a dull red heat. It is soluble in 1.02 parts of water at 30° , and in five-tenths part of boiling water, in one and five-tenths parts of cold alcohol, and in nine-tenths part of boiling alcohol. It is insoluble in ether and benzene.

Analysis.—The salt dried over sulphuric acid *in vacuo*, lost no weight at 105° .

0.3032 gram of the dried salt gave 0.1032 gram lithium sulphate, or 0.013 gram lithium = 4.27 per cent.

	Theory	Found.
Lithium.....	4.26	4.27

I am indebted to H. C. Buell and H. E. Newman for aid in these determinations.

[CONTRIBUTIONS FROM THE CHEMICAL LABORATORY OF THE UNIVERSITY OF CINCINNATI]

LV.—ON A SOLUBLE COMPOUND OF HYDRASTINE WITH MONOCALCIUM PHOSPHATE.

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Received August 27, 1897.

THE following experiments were made in connection with an endeavor to enlarge the number of soluble salts of hydrastine, especial interest attaching to the combination of the alkaloid with a mineral salt of recognized value in medicine.

As is well known, but few salts of hydrastine are readily soluble in water. In our work we made use of monocalcium phosphate, which was carefully purified by prolonged washing with alcohol. A saturated solution of the salt in cold water was prepared by thorough trituration, the phosphate being in excess. On triturating this saturated solution with a large excess of pure hydrastine, a certain amount of the latter would enter into solution, time, as was eventually found, being an important factor.

In order to ascertain the nature of the product obtained, the filtered solution was evaporated either by heat or spontaneously, or in a vacuum. In no case was it possible to detect any trace of crystallization. The solution invariably became syrupy, and finally left an amorphous residue quite similar to rosin in its appearance. This residue was soluble in about ten parts of cold water. A small amount of boiling water would change it into a syrup. Both boiling and cold alcohol dissolved it easily and in about the same proportions. The melting-point was 126° - 128° . Although there was no criterion of the purity of the substance it was submitted to analysis. No success followed an attempt to determine the amount of hydrastine present by the use of potassium permanganate, as no definite end reaction could be obtained. Resort was then had to incineration, care being taken to avoid unnecessarily high temperatures in the use of platinum dishes for the purpose. The substance dried *in vacuo* was heated to 105° . The very divergent results obtained showed that there was no fixed percentage of water held by the compound after desiccation *in vacuo*. The product of incineration was white, vitreous calcium metaphosphate.¹ It was in all cases calculated to monocalcium orthophosphate, and the difference was assumed to be hydrastine. Analytical results soon showed that prolonged trituration was necessary to increase the amount of the alkaloid taken into combination by the phosphate. From two-tenths to one-half gram was used in each analysis of the substance dried at 105° . The following analytical data were obtained:

No.	Time of trituration.	Monocalcium phosphate.		Hydrastine.	
		Per cent.		Per cent.	
1	10 minutes	44.69		55.31	
2	15 "	38.33		61.67	
3	5 "	55.70		44.30	
4	3 "	57.73		42.27	
5	80 hours ²	29.00		71.00	
6	80 "	28.03		71.97	
7	40 "	31.00		69.00	
8	50 "	30.43		69.67	
9	50 "	28.10		71.90	
10	6 weeks	28.95		71.05	

¹ Birnbaum: *Jsb. d. Chem.*, 1871, 281.

² In experiments 5-10 the alkaloid and the solution were placed in a corked bottle, and this was introduced into a box provided with paddles and suspended on an axis, which was kept in constant agitation beneath a water tap.

In order to appreciate these figures, let us note the theoretical percentages of the simpler possible combinations of monocalcium phosphate and hydrastine.

- A. $2\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{C}_{21}\text{H}_{21}\text{NO}_6$.
 $\text{Ca}(\text{H}_2\text{PO}_4)_2 = 54.10$ per cent.
 $\text{C}_{21}\text{H}_{21}\text{NO}_6 = 45.90$ per cent.
- B. $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{C}_{21}\text{H}_{21}\text{NO}_6$.
 $\text{Ca}(\text{H}_2\text{PO}_4)_2 = 37.9$ per cent.
 $\text{C}_{21}\text{H}_{21}\text{NO}_6 = 62.1$ per cent.
- C. $2\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot 3\text{C}_{21}\text{H}_{21}\text{NO}_6$.
 $\text{Ca}(\text{H}_2\text{PO}_4)_2 = 28.9$ per cent.
 $\text{C}_{21}\text{H}_{21}\text{NO}_6 = 71.1$ per cent.

It will be seen at once that the apparent limit of the amount of hydrastine which can enter into combination with the phosphate, as shown by analyses 5-10, is practically identical with the percentage of the alkaloid present in the hypothetical salt C, where two molecules of monocalcium phosphate are in combination with three molecules of the alkaloid. In the picrate of hydrastine, one of the few crystalline derivatives, we encounter a combination of equal molecules [$\text{C}_6\text{H}_2(\text{NO}_2)_3\text{OH} \cdot \text{C}_{21}\text{H}_{21}\text{NO}_6$], the amorphous sulphate and chloride ($\text{C}_{21}\text{H}_{21}\text{NO}_6 \cdot \text{H}_2\text{SO}_4$) correspond, however, to the formula B. While the formula C is unsupported by analogy and the aid of crystallization is lacking, the analytical data point strongly towards this as the correct expression for the product obtained by the method described.

TORONTO MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE British Association for the Advancement of Science met in Toronto, August 18-25. Many prominent scientific men from Canada and the United States, as well as from Great Britain, were in attendance.

Professor William Ramsay, of London, was president of the chemical section. His address was on "An Undiscovered Gas." A consideration of the periodic law and of the atomic weights of helium and argon (4 and 40) suggests that there may be another similar element with an atomic weight of about 20. Helium has been subjected to a long series of diffusions by Pro-