ON THE DECOMPOSITION OF PHOSPHATES BY SODIUM BISULPHATE. II.

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(*Concluded.*)

The results of the decomposition of apatities from Canada already recorded (*Jour. Am. Chem. Soc. 7, 238*), would probably in themselves justify the conclusion that the sodium bisulphate is a good solvent for these minerals. But, by extending this investigation a little farther, I obtained similar results with other minerals, containing phosphoric acid, and that without any apparent interference from their basic constituents. The phosphoric acid, whether bound to aluminum, calcium or iron, is dissolved and a sodium phosphate formed. While considering this process, I had procured phosphates from a number of available sources, and subjected them to the same treatment as the Canadian apatites. The mixtures of the finely pulverized phosphates and bisulphate where heated to about 450° C., at which temperature the mass is perfectly fused, often to a clear liquid, which becomes opaque and milky after a few minutes of heating. The cooled mass is then dissolved in water, and in the case of a mineral very rich in phosphoric acid, the solution is brought to 100 c. c., and of this 20 c. c. are used for the determination of phosphoric acid. The differences which exist between the amounts of phosphoric acid contained in the minerals, and the amounts found in the liquids resulting from this process, are mainly owing to inaccuracies of experiment and not, I think, due to any fault of the process. To further illustrate and verify the conclusions already expressed, I give the results of the application of this process to phosphates other than apatites. All determinations were made with amonium molybdate. In some cases I have determined the amounts of aluminium and iron, to see if these would exercise an influence upon the process, but could find no difference.

	Average phosphoric acid (P_2O_5) to 1 grm.		
	Mineral.	Solution.	Loss.
1. Coprolite, obtained from Hamburg, found in Hanover; exact locality unknown	0.3156	0.2761	0.0395
2. Phosphorite from Nassau, Germany	0.3743	0.3619	0.0124

3. Spanish phosphate	0.2487	0.2273	0.0214
4. Fossils ("shark's teeth") from S. Carolina	0.3398	0.3378	0.0020
5. Slag from old Dover furnace, Ocean county, New Jersey	0.0263	0.0236	0.0026
6. Marl from near Farmingdale, New Jersey. A greenish earth, very wet. The figures refer to the dried substance	0.0259	0.0150	0.0109

In the case of No. 6, 5 grms. of marl where added to 2 grms. of sodium bisulphate and 10 c. c. m. of water in a flask, boiled for 45 minutes, the whole was brought upon a filter, washed, and in one-fifth of the solution the phosphoric acid was determined.

Mixing 1 grm. of the marl with 2 grms. of bisulphate and melting it as above, the result was different. The amounts of phosphoric acid, obtained in solution, were 0.0270; excess = 0.00108.

If we may accept these results as a fair representation of the working of the process, assuming that the losses indicate the amounts of phosphoric acid undissolved or remaining in the undecomposed mineral, the following table, giving the amounts of phosphoric acid contained in the minerals and the dissolved acid in percentage, will serve to give a better view of the result.

	Contained.	Dissolved.
1. Coprolite	31.3%	88.0%
2. Nassau phosphorite	37.4%	96.5%
3. Spanish phosphate	24.9%	97.5%
4. S. Carolina fossil	33.9%	99.4%
5. Slag	2.6%	83.3%
6. Canadian apatite	33.4%	96.4%

In the following are given the weights of magnesium pyrophosphate obtained, one result being given for each mineral:

	Mineral.	Solution.
1. Coprolite	0.099	0.091
2. Nassau phosphorite	0.118	0.113
3. Spanish phosphate	0.078	0.077
4. S. Carolina fossil	0.107	0.103
5. Slag	0.036	0.030
6. Canadian apatite	0.106	0.105

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