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U. S. PATENT OFFICE,
Washington, D. C.

NOTES.

On the Radio-Activity of "Salt-Lime." In a paper read before the Indiana Academy of Science, November 27, 1906, the composition of the first deposit from the solar evaporation of sea water, called by the salt-makers, "Salt-Lime," was shown to be—"mainly gypsum" with about 0.65 per cent of calcium carbonate and remarkably free from traces of other salts.

It was suggested at that time that, "owing to the wide distribution of radio-active material, more or less of it must find its way into the ocean, and, judging from the probable position of radium in the periodic system, the radium ought to be found as sulphate among the less soluble constituents of the ocean water. As only thirty or forty bushels of salt lime are obtained from the evaporation of an amount of sea water which would yield 5000 bushels of salt, it will be seen that the substance represents a high degree of concentration of the less soluble material in sea water.

This fact led to the testing of the substance for radio-activity. Tests of the original material made by the method of Strutt¹ showed an activity of 18.0×10^{-15} g. of radium per gram of salt lime. This number was calculated by the use of the latest ratio (Rutherford & Boltwood) between uranium and radium, namely 3.8×10^{-7} g. of radium per gram of uranium.

Strutt finds² (using an older, incorrect, ratio between uranium and radium) that the activity of "sea salt" (presumably total product of evaporation of sea water) is 0.15×10^{-12} g. of radium per gram of sea salt. Using the same ratio between uranium and radium that he used in that case (7.4×10^{-7} g.) the salt lime gives an activity of 0.35×10^{-13} ,

¹ Pr. Roy. Soc. Series A, 77, 519.

² Ibid., 78, 522.

or a trifle less than one fourth as active as sea salt. This would seem to indicate that the radium sulphate in the sea water is not sufficient in amount to form a saturated solution and that the major portion of it does not come down with the first portions of the other, slightly soluble salts, but comes down subsequently on still further evaporation. In the commercial preparation of salt it may come down largely with the sodium chloride or it may still remain in the "bittern" or "bitter water" that remains after the salt crystallizes. Some further work with these last possibilities may follow.

A sample of 1445 g. of salt-lime was concentrated down to 36 g. by boiling with sodium hydroxide followed by washing with water and dissolving in hydrochloric acid, then repeating these operations on the undissolved residue many times. The concentrate showed a decided increase in activity over the original material. An accident prevented an exact quantitative comparison with the original material, but allowing for the probable per cent. of error, which is large when measuring the activity of the very feebly active salt lime, the results showed that approximately all of the radioactive material was retained during the concentration.

I am indebted to Prof. R. B. Moore of Butler College for kindly making for me the measurements of the radio-activity of this material.

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Indianapolis, Ind., April 16, 1907.

A Benzene Model, on One Plane, for Lecture Purposes.—This model is intended as an aid to teachers in explaining the theory of the constitution of benzene. Any theory regarding its constitution must account for and explain the behavior of benzene towards reagents and its power of forming derivatives. In the aliphatic series it is usual to represent the hydrocarbons graphically with the carbon and hydrogen atoms arranged as in an open chain. The model held as in Fig. 1 would thus represent benzene, showing eight unsatisfied affinities.

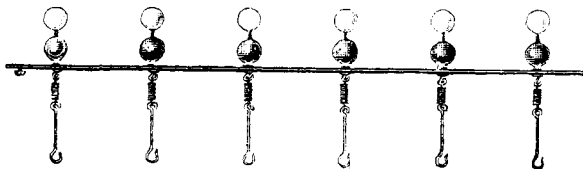


Fig. 1.

But the following summarized characteristics of this body cannot be reconciled with such an open-chain representation, namely :

(a) That each of its hydrogen atoms bears the same relation to the molecule, as is evident by the non-existence of isomeric mono-substitution compounds.