

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.

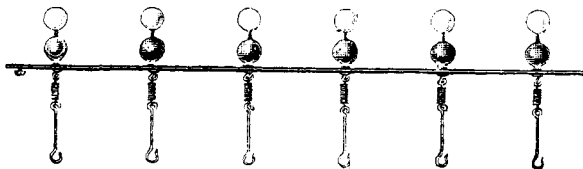


Fig. 1.

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.

(b) The formation of benzene as a constant product of the decomposition of the other members of the aromatic series.

(c) The formation of hexa-additive compounds (and no more) and the ready breaking up of these into a tri-substitution product.

(d) The formation of three di-substitution products.

(e) The evident "saturated" nature of benzene.

It is clear from (c) that there can be only six unsatisfied affinities, so, if the model is bent round to form a circle, as in Fig. 2, thus linking the first carbon atom to the last, the number of unsatisfied affinities is shown as being reduced to six, and, in addition, each carbon and hydrogen atom is represented as bearing the same relation to the molecule, all being similarly linked.

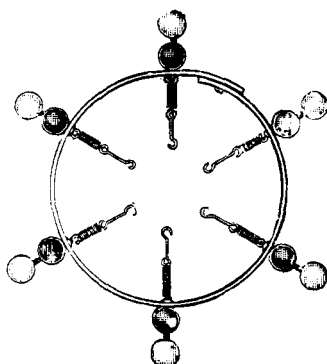


FIG. 2

But the fourth valence of the carbon atoms still appears as unoccupied; these may be represented as acting *towards* the centre—as in the Armstrong-Baeyer formula, or the diagonally opposite atoms may be linked together (Claus); figure 3. If this is done, the model will then represent an exceedingly stable molecule.

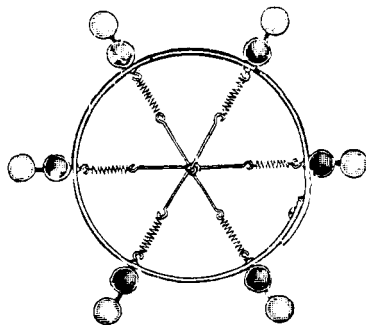


FIG. 3

Small spiral springs are used in the interior of the "ring," to permit of the rapid and secure fastening together of the diagonally opposite

linkings in the last position. The model can readily be constructed from a flexible brass band 1-2 cms. wide, with stiff wires soldered through holes in the rim, while corks of different colors serve admirably for the carbon and hydrogen atoms. It is, however, obtainable from Messrs. Baird and Tatlock, London, E. C.

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NEW BOOKS.

A TEXT-BOOK OF ELEMENTARY ANALYTICAL CHEMISTRY, QUALITATIVE AND VOLUMETRIC, BY JOHN H. LONG, M. S., Sc. D. THIRD EDITION. PHILADELPHIA, P. BLAKISTON'S SONS & CO., 1906, pages XII + 299. Price \$1.25.

This admirable text-book has appeared in a third revised and enlarged edition. It is becoming more and more the custom to give instruction in volumetric analysis in the second year's work in chemistry in colleges and there are certain advantages in this over the old way of taking up gravimetric analysis immediately after qualitative work. This is the plan of Dr. Long's book and those teachers who favor this method can hardly do better than to have their students use this text-book as their laboratory guide.

The directions for work are very clear and precise and sufficiently full. All the explanation that is needed is given. There is not too much theory, the instructor can supply any further theories that may seem desirable to him. In this new edition a chapter has been added in which a general discussion of reactions in solutions is given. In this chemical equilibrium, solubility product, hydrolysis, etc., are considered. The qualitative processes have been simplified in a number of ways and several new volumetric methods, such as the titration of borates and formaldehyde have been added.

It can be truly said that this text-book has so many merits that it deserves to be very widely used.

EDWARD H. KEISER.

A SHORT MANUAL OF ANALYTICAL CHEMISTRY, BY JOHN MUTER. FOURTH AMERICAN EDITION, ILLUSTRATED. p. 242 P. BLAKISTON'S SONS & CO., PHILADELPHIA. Price \$1.50.

The very fact that the book has reached its fourth edition clearly shows that it has much merit. It includes both qualitative and quantitative analyses of organic and inorganic products.

Part 1 deals with the detection of metals, acid radicals, and alkaloids, and gives details for qualitatively analyzing unknown salts.

Part 2 deals with volumetric, gravimetric and ultimate organic analyses as well as with special processes for the analysis of water, air, foods, drugs and urine.

The last chapter is devoted to the analyses of gases, polarization and spectroscopy. The arrangement is very satisfactory, and the index is