

mechanical irritation of the intestine caused by the large amount of aluminum ingested.

The addition of aluminum in varying amounts to the diet of the young rats appeared to have no great effect during the period of our observation. The rats in most cases progressed equally well as was shown by their comparative increase in bodily dimensions and weekly weights. In but one instance, that of the death of a rat receiving 300 mg. of aluminum, could any great ill effect that could be observed during the period of our experiments be attributed to aluminum.

Using amounts of aluminum up to 300 mg. daily for a period of about four months we were unable to perceptibly influence the growth of young rats receiving a diet containing a fixed amount of phosphorus.

Absorption of aluminum takes place both in dogs and rats when fed in the amounts administered by us over a considerable length of time, the liver being the site of greatest deposition.

It will be, of course, recognized that these experiments have no special bearing on the question of the behavior of alum compounds as used in the diet of man, largely because the weights of aluminum employed in our experiments are relatively high in proportion to the body weights of the animals on which the trials were made. Even a very excessive use of alum compounds could scarcely furnish an amount of the metal in excess of 5 or 6 mg. daily per kilo of body weights. With the rats the ingestion of aluminum amounted to 500 to 3,000 mg. daily per kilo of body weight, while in our experiments the aluminum minimum daily was about 100 mg. per kilo of body weight.

Our investigations confirm the statements of members of the Referee Board with reference to the deflection of phosphorus, but we have carried the dosage to this extreme to be able to show just what would happen under these conditions. But it must be kept in mind that many other substances when ingested in greatly excessive amounts, would probably show equally bad effects.

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NOTES.

Note on the Formation of Esters.—In an interesting communication¹ entitled "Studies on Catalysis: The Addition Compounds of Esters with Organic Acids," Kendall and Booge deduce experimental evidence for an intermediate compound theory, and give examples of many compounds formed by organic acids and ethereal salts.

Work of this character is very suggestive to me, since I have endeavored to attack the same problems with Professor Evans, of McGill University. The outbreak of war stopped researches of this kind, and as it is unlikely

¹ THIS JOURNAL, 38, 1712 (1916).

that the work can be resumed for a long time at least, I shall merely outline the tentative results that we have obtained.

There is little to be added to Kendall and Booge's review of previous work. Maass and McIntosh have experimented with the hydrobromic acid compounds of the esters, not the hydrochloric complexes, and McIntosh¹ has isolated combinations of ethyl acetate, hydrochloric and hydrobromic acids. Work of particular moment has been done by Baume² and his colleagues. They have shown that acids, such as propionic, unite with strong acids such as hydrochloric, giving compounds of a very simple type; and that this complex unites with methyl alcohol yielding a substance containing one molecule each of organic and inorganic acid and alcohol. Further, by treating the methyl alcohol-hydrochloric acid compound with propionic acid they were able to show that methyl propionate was actually produced at low temperatures.

The results of Evans and McIntosh may be briefly summarized:

1. The freezing-point curves of systems such as methyl alcohol and acetic acid show no combinations. The curves slope gradually to their eutectic points.

2. Methyl or ethyl alcohol forms compounds with strong acids such as hydrobromic.

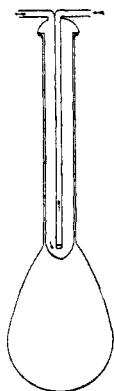
3. This is true of acetic acid and methyl or ethyl acetate.

4. Mixtures of acetic acid and the alcohols in molecular proportions apparently yield compounds with strong acids such as hydrobromic. Whether the same molecule of acid has combined with both the acetic acid and the alcohol, or whether merely a mixture of two compounds was obtained has not been determined.

5. We have not noticed the formation of the ester at low temperatures.

6. Water, while insoluble in the esters or hydrobromic acid at low temperatures, is soluble in mixtures of the two. D. MCINTOSH.

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During some protein investigation work at the University of Missouri last year, the type of condenser shown in the figure was devised especially to do away with cork or rubber connections. As used, the space between condenser and neck of flask is about $\frac{1}{16}$ of an inch. The lower one-third of condenser is more or less tapered, as is not shown in the drawing. Its simplicity recommends it for various kinds of reflux work when properly sized to the flask in use.³ H. P. FISHBURN.

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¹ THIS JOURNAL, 28, 589 (1906).

² Arch. sci. phys. nat., 33, 415 (1912).

³ A member of the Board of Editors reports that he has used a large test tube closed with a 2-hole rubber stopper for the same purpose.