

Citation:

Romburgh, P. van, The decomposition of penta-erythritol tetraformate on heating, in:
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This seeming contradiction may be met by the explanation that the exchange of substance between the leucocytes and the solution of NaCl, especially when the latter is isotonic with the serum, is very small; whilst in the case of other cells (ciliated cells, muscular fibre cells) the conditions of the exchange of ions are not so restricted, and consequently the chemical structure of these cells is more easily modified. And it is obvious that a modification of their chemical structure causes a disturbance in their inherent functions.

13. From the facts here recorded, it is evident that in studying the action of the phagocytes on bacteria *in vitro*, the degree of osmotic concentration and of the alkaline reaction of the medium, must be taken into account. This condition has been lost sight of in several of the experiments. They ought therefore to be repeated.

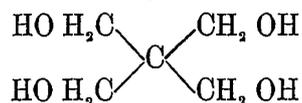
Groningen, June 1907.

Chemistry. — “*The decomposition of penta-erythritol tetraformate on heating.*” By Prof. P. VAN ROMBURGH.

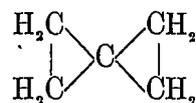
(Communicated in the meeting of June 29, 1907).

As the heating of the diformate of *s.* divinylglycol had led in such a simple manner to hexatriene 1.3.5, investigations have been set on foot in my laboratory for studying the decomposition of formic esters of polyhydric alcohols, the results of which will be gradually communicated.

If for penta-erythritol we accept the formula:

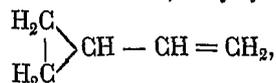


and if the reaction took place in a similar manner as with *s.* divinylglycol diformate, we might expect on heating the tetraformate¹⁾ the formation of a hydrocarbon of the formula:



in which occurs twice a 3-ring.¹⁾

¹⁾ GUSTAVSON C. R. 123 (1896) 242 obtained from the tetrabromide of penta-erythritol, by the action of zinc and alcohol, vinylcyclopropan:



instead of the above cited hydrocarbon.

The reaction, however, proceeds in quite a different sense, for instead of the hydrocarbon we only obtain carbon monoxide, while penta-erythritol is regenerated.

In order to prepare the tetraformate of penta-erythritol, this substance is heated with an excess (8 mols.) of concentrated formic acid in a flask connected with a condenser, in such a manner that the excess of acid distils over slowly with the water formed in the reaction. When the thermometer placed in the liquid shows 120° , the heating is stopped, and the distillation is repeated with a fresh quantity of formic acid. After this the heating is repeated twice with 100% acid. There then remains in the flask an oily liquid, which, when placed in a dish over sulphuric acid, abundantly deposits crystals after some time. These are collected at the pump, and then thoroughly pressed between filterpaper.

The solid substance thus obtained, after having been recrystallised from dry benzene, melts at 55° . After repeated recrystallisation from that solvent, the melting point rose to 57° and then remained constant.

This formate is sparingly soluble in ether; from a solution in benzene it is precipitated by ether. It has a slightly bitter taste.

On boiling with a titrated solution of potassium hydroxide the formic acid formed may be readily estimated.

Found 74.21 and 74.16% formic acid

Calculated = 74.18%.

The ultimate analysis gave the values expected for penta-erythritol tetraformate :

	Found	Calculated for $C_9 H_{12} O_8$
C	43.6 43.75	43.57%
H	5.26 5.16	4.88%

On heating this formate, a plainly visible evolution of gas commences at 220° , which is fairly strong at 230° . The gas evolved consists of pure carbon monoxide and when the evolution of gas has ceased, there remains in the flask pure penta-erythritol, which may be readily identified as such by its properties. The amount of gas evolved is that required by theory.

I wish to express my thanks to Mr. VAN ENDT, who has assisted me in these experiments with care and zeal.

Mr. RENIER, who is engaged in the study of the formates of glycols found that from 2.5 dimethyl-hexandiol 2.5, the well known tetramethyldihydrofuran, is formed by simply heating with formic acid.

On the other hand the formic ester of pentandiol 2.4 is very stable towards heat.

At about 400°, however, the ester is decomposed and a liquid is formed boiling at 42° which is most probably 1.2 dimethylcyclopropane.

Mr. VAN MAANEN, is engaged in the study of the decomposition of the formic esters of mannitol.

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Botany. — “*On the influence of wound stimuli on the formation of adventitious buds in the leaves of Gnetum Gnemon L.*” By Mr. J. VAN BEUSEKOM. Communicated by Prof. F. A. F. C. WENT.

(Communicated in the meeting of June 29, 1907).

It had been observed for a long time already that adventitious sprouts were formed on the leaves of a specimen of *Gnetum Gnemon L.*, cultivated in the Botanic Garden at Utrecht.

In January 1906 my attention was drawn to this circumstance by Prof. WENT, who advised me to study the development of these adventitious sprouts, and to try to discover the origin of their formation.

The results of this investigation will be concisely communicated here.

The adventitious buds appear on the tips of the leaves, while these are still attached to the plant.

As far as I have been able to find out, the formation of these adventitious buds has never before been observed with *Gnetum Gnemon*, neither in its natural sites, nor in botanic gardens¹⁾ except at Utrecht. The Utrecht Garden possesses three specimens of *Gnetum Gnemon*. One of these has been continually cultivated in a hothouse where in winter the temperature is kept at about 25° C., and the air is very damp. The other two were, when I began my investigation, in an other hothouse where the temperature is lower (in winter on an average 15° C.), and the humidity less. Whereas of the former I have always obtained leaves in different stages of bud-formation, the other two showed the phenomenon only after they had been conveyed to the warmer and damper hothouse.

Although all three plants, apart from the formation of adventitious buds, are evidently healthy and do not make a morbid impression

1) On this point I gained information from the other botanic gardens in our country, from that at Munich and also from that at Buitenzorg.