

*Citation:*

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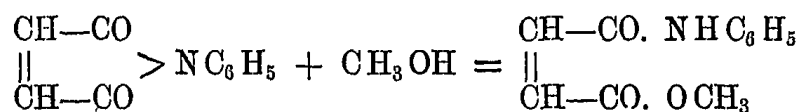
easily be made in sulfates of univalent and bivalent metals, without altering their crystallization. In double arseniate of ammonium and calcium phosphoric and vanadic acid cannot fill the place of arsenic acid, while in lead-apatite the three acids can be exchanged without any visible change in the form and structure of the crystals. Here isomorphism is restricted to small groups of compounds, whose limits are narrow and sharply defined; in other cases the limits of isomorphous groups are very wide, wider than generally admitted. Take for example the double arsenate of ammonium and calcium,  $(\text{NH}_4)_2 \text{Ca As O}_4 + 6 \text{H}_2 \text{O}$ . In this compound Ca can be exchanged for Ba, Sr, Pb, Mg, Mn, Fe, Co, Ni, Zn, Cd and Cu. Nearly the same extension of change is found in triple acetates of the type:  $\text{Na Mg (UO}_2)_3 (\text{C}_2 \text{H}_3 \text{O}_2)_9 + 9 \text{H}_2 \text{O}$ . They form rhombohedral crystals, imitating the regular (tetrahedric) crystals of the compound  $\text{Na (UO}_2) (\text{C}_2 \text{H}_3 \text{O}_2)_3$ . Speculation on a possible connexion between the wide range of isomorphism in complicated double and triple compounds with their constitution leaves the impression, that their form is ruled and fixed by constantly recurring nuclei of great volume, or, with other words: that isomorphism and morphotropism have a cause in common. The nucleus of the triple acetates is the compound  $\text{Na (UO}_2) (\text{C}_2 \text{H}_3 \text{O}_2)_3$ . Morphotropism plays here a prominent part, accompanying isomorphism and producing a striking imitation of regular forms in rhombohedral crystals. Obviously a connexion exists between these phenomena and the combination of isomorphism and morphotropism, found in some families of minerals, e.g. the pyroxenes, where exchange of Mg for Ca, of Ca for Zn or Mn does change the system of crystallization, while the general shape or habitus of the crystals remains unchanged.

**Chemistry.** — *„On the action of methylic alcohol on the imides of bibasic acids”*. By Prof. S. HOOGWERFF also in the name of Dr. W. A. VAN DORP.

In April of this year we have placed in the *Recueil des Travaux Chimiques des Pays-Bas et de la Belgique* a short account, which shows that, by heating the imides of bibasic acids with methylic alcohol containing muriatic acid, the methylic ethers of the amido-acids, corresponding to the imides, are formed in some cases.

At least this was observed with the phenylimides of succinic acid and maleic acid, also with those, substituted in the radical of the acid. For example the phenylimide of maleic acid with methylic alco-

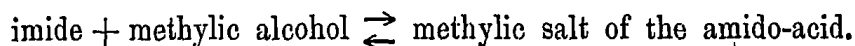
hol containing muriatic acid forms the ethereal salt according to the equation



On a closer study of this reaction we have found that the co-operation of the muriatic acid may be promotive in some cases to the formation of the methylic salt, but is not required for it.

Several imides investigated by us are transformed partly in the ethereal salts of amido-acids, when heated with absolute methylic alcohol without the addition of methylic alcohol containing hydrochloric acid. It is best to work in sealed glass tubes at temperatures between 150°—200° C. and sometimes higher still; but methylic salt formation also takes place when the imides are for a long time boiled with methylic alcohol.

We could show besides in some cases that these ethereal salts, when heated with methylic alcohol, are partly transformed again in imides and methylic alcohol. Perhaps these reactions are reversible:



This point will be investigated.

BERTHELOT and PÉAN DE ST. GILLES in their classic papers on the formation of ethers from acids and alcohols say, that the maximal quantity of ethereal salt that can be formed is but slightly dependent on the temperature. This seems equally to be the case, at least sometimes, in the case of the formation of the ethereal salts of amido-acids from imides.

We have prepared the ethereal salts of the corresponding amido-acids from the following imides by heating with methylic alcohol: succinimide, succinphenylimide, succinparanitrobenzylimide, maleinphenylimide, phtalphenylimide.

Succinimide  $\begin{array}{c} \text{CH}_2\text{—CO} \\ | \\ \text{CH}_2\text{—CO} \end{array} > \text{NH}$ , when heated for three hours in sealed tubes with the octuple weight of absolute methylic alcohol at a temperature of 170° C., gives the methylic salt of the succino-

amido-acid  $\begin{array}{c} \text{CH}_2\text{—CO—NH}_2 \\ | \\ \text{CH}_2\text{—CO O CH}_3 \end{array}$  in large quantity.

We prepared this ethereal salt, which we did not find mentioned

in literature, also by letting methylic iodide act upon the silver salt of succinoamido-acid, and convinced ourselves that both compounds are identical. If the imide is boiled with methylic alcohol, ethereal salt formation takes equally place, though slowly.

The transformation of the succinphenylimide  $\begin{array}{c} \text{CH}_2-\text{CO} \\ | \\ \text{CH}_2-\text{CO} \end{array} > \text{N C}_6\text{H}_5$  in the ethereal salt of the amido-acid  $\begin{array}{c} \text{CH}_2-\text{CO}-\text{NH C}_6\text{H}_5 \\ | \\ \text{CH}_2-\text{CO}-\text{CO O CH}_3 \end{array}$ , which takes place easily if methylic alcohol containing muriatic acid is used, seems to be more difficult when this alcohol alone is employed. We had to heat up to 240° C. in order to obtain a satisfactory result. We consider our work with this imide as not yet finished.

If the succinparanitrobenzylimide  $\begin{array}{c} \text{CH}_2-\text{CO} \\ | \\ \text{CH}_2-\text{CO} \end{array} > \text{N CH}_2\text{C}_6\text{H}_4\text{NO}_2$  is heated with a septuple quantity of methylic alcohol for some hours at 170° C., a small quantity of the ester  $\begin{array}{c} \text{CH}_2\text{CO}\cdot\text{NH}\cdot\text{CH}_2\cdot\text{C}_6\text{H}_4\text{NO}_2 \\ | \\ \text{CH}_2\cdot\text{CO O CH}_3 \end{array}$

is formed. Experiments on ethereal salt formation at lower temperatures were not made in this case. On the other hand this methylic salt, when heated to 170° C. with methylic alcohol, is for the greater part transformed in the imide.

The maleinphenylimide  $\begin{array}{c} \text{CH}-\text{CO} \\ || \\ \text{CH}-\text{CO} \end{array} > \text{N C}_6\text{H}_5$  (1 part), when heated with methylic alcohol (7 parts) at 170° C., is transformed partly in the methylic phenylamidomaleinate  $\begin{array}{c} \text{CH}-\text{CO}-\text{NH C}_6\text{H}_5 \\ || \\ \text{CH}-\text{CO O CH}_3 \end{array}$ . The same reaction takes place already, though slowly, when the phenylimide is boiled with methylic alcohol.

The phtalphenylimide  $\text{C}_6\text{H}_4 \begin{array}{l} \diagup \text{CO} \\ \diagdown \text{CO} \end{array} > \text{N C}_6\text{H}_5$ , when heated with methylic alcohol on a waterbath in a flask connected with an inverted condenser, or at a higher temperature in sealed tubes, produces small quantities of the methylic phenylamidophtalate  $\text{C}_6\text{H}_4 \begin{array}{l} \diagup \text{CO}-\text{NH C}_6\text{H}_5 \\ \diagdown \text{CO O CH}_3 \end{array}$ . The fact of this ethereal salt being unstable against methylic alcohol we learn at once, when trying to crystallize

it from this solvent. The warm solution soon deposits some phenylimide.

To conclude we have found in comparative experiments that the imides form the ethereal salts of amido-acids much easier with methyllic alcohol, than with aethylic- or propylic alcohol. The greater ethereal saltforming faculty possessed by the former alcohol<sup>1)</sup> shows itself equally in these experiments.

We herewith tender our best thanks to Messrs. VAN BREUKELEVEEN and VAN HAARST, who assisted us with great zeal in the present investigation.

*Delft/Amsterdam, October 1898.*

Physics. — „*Description of an open manometer of reduced height*”.  
By Prof. H. KAMERLINGH ONNES.

(Will be published in the Proceedings of the next meeting).

Zoology. — „*Cup-shaped red bloodcorpuscles. (Chromocraters)*”.  
By Dr. M. C. DEKHUYZEN. (Communicated by Dr. P. P. C. HOEK).

The red bloodcorpuscles of the lamprey (*Petromyzon fluviatilis*) when examined living or after fixation, exhibit a remarkable shape, which has escaped the attention of investigators. They are bell-or cup shaped cells. Their body contains a rather deep cavity which may be called an „oral invagination”. The rather wide opening<sup>1)</sup> is round, but owing to the facility with which the cells change their shape, may become a split or a triangle.

A second less evident „aboral” invagination is found at the aboral pole, in a somewhat eccentric position however. Seen from above one of the poles, the cell is somewhat oval, almost round. No wonder that such a shape is not recognized, when the blood is spread out in a thin layer, dried and then preserved.

There is scarcely an object imaginable better calculated to make the objections evident which must be alleged against the usual methods of drying for the purpose of investigating the blood.

True amoeboid properties are wanting; some of the damaged cells

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<sup>1)</sup> Vid. MLNSCHUTKIN. Lieb. Ann. **195**, p. 357.