$P1 = (c,-d,-a,\ 0,-g,\ h)$ $\quad Q1 = (d,\ c,\ 0,-a,\ -h,-g)$

$P2 = (d,\ c,\ 0,-a,\ h,\ g)$ $\quad Q2 = (c,-d,-a,\ 0,\ g,-h)$

$P3 = (0,-f,\ g,-h,-a,\ 0)$ $\quad Q3 = (f,\ 0,\ h,\ g,\ 0,-a)$

$P4 = (f,\ 0,-h,-g,\ 0,-a)$ $\quad Q4 = (0,-f,-g,\ h,-a,\ 0)$

$P5 = (g,-h,\ 0,\ f,\ c,-d)$ $\quad Q4 = (h,\ g,-f,\ 0,\ d,\ c)$

$P6 = (h,\ g,\ f,\ 0,-d,-c)$ $\quad Q6 = (g,-h,\ 0,-f,-c,\ d)$;

if besides is satisfied

$$ch + dg = af - gh = 0.$$

The peculiarity appearing with this example taken for simplicity's sake, that the right lines show mutually some incidences, is lost by submitting the coordinates in Sp_5 first to a linear transformation.

In the same way, indeed, we can formulate for all *Cff.* indicated in spaces of a lower number of dimensions an analytical definition by deducing the coordinates of their elements from those of the elements of K^{VII}.

Chemistry: — "*On the constitution of* VAN GEUNS's *oxymethyldinitrobenzonitrile*". By Dr. J. J. BLANKSMA. (Communicated by Prof. A. F. HOLLEMAN).

By the action of potassiumcyanide on meta-dinitrobenzene in methylalcoholic or ethylalcoholic solution, LOBRY DE BRUYN [1]) obtained in 1882 the oxymethyl- or oxyethylnitrobenzonitrile $C_6H_3(OCH_3)\,CN\,NO_2$ 1. 2. 3.

The investigation of these substances was continued afterwards by VAN GEUNS [2]) who succeeded in saponifying these nitriles to acidamines and in preparing the corresponding acids thereof. At the same time VAN GEUNS showed that in both substances a further nitro-group can be introduced by nitration with nitric and sulphuric acids thus yielding the compounds $C_6H_2(OCH_3)\,CN\,(NO_2)_2$ m.p. 113° and $C_6H_2(OC_2H_5)\,CN\,(NO_2)_2$ m.p. 63°, These two compounds contain a movable nitro-group which may be readily replaced by OH, OCH_3, NH_2, $NHCH_3$, NHC_6H_5 etc.

As, however, the place where the nitro-group had been introduced had remained unknown, the constitution of these derivatives was consequently also unknown.

When VAN GEUNS, owing to his departure for India was obliged

[1]) Recueil 2, 205.

[2]) Dissertation Amsterdam 1903.

to discontinue this research I tried at the request of the late Prof. LOBRY DE BRUYN to determine this constitution. After a few trials which led to no result the method was followed which had proved successful in the determination of the constitution of 2.3.4 trinitrophenetol[1]). The constitution of that substance was shown to be:

$$C_6H_2(OC_2H_5)(NO_2)_3\ 2.3.4 \rightarrow C_6H_2(OC_2H_5)NH_2(NO_2)_2\ 1.3.2.4 \rightarrow C_6H_3(OC_2H_5)(NO_2)_2\ 2.4.$$

Oxymethyldinitrobenzonitrile was now treated in an analogous manner; by the action of alcoholic ammonia one NO_2-group was replaced by NH_2 and this was then in turn removed by diazotation and boiling with alcohol. In this manner was obtained an oxymethylnitrobenzonitrile (m.p. 126°) $C_6H_2(OCH_3)\ CN(NO_2)_2 \rightarrow C_6H_2(OCH_3)\ CN.NH_2NO_2 \rightarrow C_6H_3(OCH_3)CN.NO_2$.

This shows that the NO_2-group at 3 is replaced by NH_2 as otherwise the original oxymethylnitrobenzonitrile $C_6H_3(OCH_3)CN.NO_2$ 1.2.3 m.p. 171° would have been reobtained. Now it remained only to determine the constitution of this substance. On treatment with nitric and sulphuric acids an oxymethyldinitrobenzonitrile was obtained which melts at 71° and which possesses the following constitution: $C_6H_2(OCH_3)CN(NO_2)_2$ 1.2.4.6 [2]).

The constitution of this substance was determined in the following manner. If this compound is treated in alcoholic solution with ammonia or methylamine the OCH_3 group is readily substituted by NH_2 or $NHCH_3$ and dinitrocyano-aminobenzene m.p. 219° or dinitrocyano-methylaminobenzene m.p. 161° is formed which substances were prepared previously from the corresponding oxyethyl compound [3]).

The oxymethylnitrobenzonitrile m.p. 126° was then heated at 150° with hydrochloric acid for 5 hours. On opening the tube a gas escaped which burnt with a green-bordered flame (CH_3Cl) whilst in the tube there were present crystals which after recrystallisation from water melted at 228° and proved to be 5-nitrosalicylic acid (C_6H_3 COOH, OH, NO_2 1. 2. 5.) In the motherliquor the presence of NH_3 was detected, formed by saponification of the cyano-group. For the purpose of identifying the substance obtained a little of the preparation was mixed with an equal quantity of 5-nitrosalicylic acid (m.p. 228° prepared by nitration of salicylic acid [4]). The melting point

[1]) Recueil **27**, 49.

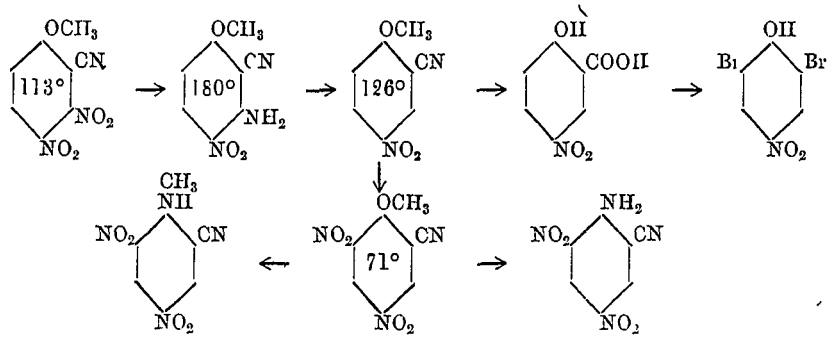
[2]) This shows that in oxymethylnitrobenzonitrile m.p. 126° the nitro-group is placed on 4 or 6.

[3]) BLANKSMA. Rec. **20**, 413. **21**, 274.

[4]) HÜBNER. Ann. **195**, 31.

was not altered thereby. Both preparations could also be converted readily into 2-6-dibromo-4-nitrophenol m.p. 141° by treatment with bromine water [1]).

The following reactions were applied:

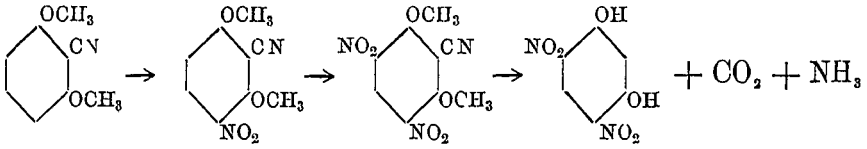


This proved that the constitution of the oxymethyldinitrobenzonitrile prepared by VAN GEUNS is $C_6H_2(OCH_3), CN, (NO_2)_2$. 1, 2, 3, 4.

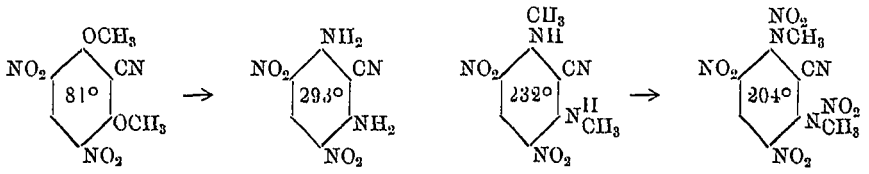
At the same time it was shown that the movable NO_2-group in this substance is placed at 3; consequently we now know the constitution of the compounds obtained from it by substitution of the NO_2-group by OH, OCH_3 etc.

Finally, the constitution was determined of the dinitrodimethoxybenzonitrile obtained by the nitration of $C_6H_3(OCH_3)_2$ CN 1, 3, 2, or of the nitrodimethoxybenzonitrile $C_6H_2(OCH_3)_2$ CN. NO_2 1, 3, 2, 4. [2]).

This compound was converted into 4-6-dinitro-resorcine m.p. 215° by being heated for 5 hours at 150° – 160° with hydrochloric acid (30 % HCl); from this follows that its constitution is $C_6H(OCH_3)_2$ CN $(NO_2)_2$ 1. 3. 2. 4. 6.



4.6 dinitro-2-cyano 1.3 dimethoxybenzene on treatment with alcoholic ammonia or methylamine readily yields compounds which perfectly resemble the compounds which have been obtained in a similar manner from 2.4.6 trinitroresorcinoldimethylether.



[1]) LELLMANN and GROTHMANN. Ber. 17, 2731.

[2]) Dissertation VAN GEUNS. p. 69.