members except the last one and we get thus

$$s = x_5^0 w_5$$

as the velocity of germ-formation.

In this calculation we have neglected reactions between clusters. The reason is that the concentration of clusters even of low orders (e. g. two) is small as compared to the concentration of single particles. Furthermore we have neglected the possibility that the germ $\overset{\bullet}{Q}_6$ may loose a particle, or rather we have assumed that a sixth member in the sum derived from the fifth by multiplication with w_{-5}/w_6 is small against the fifth. This again means that we have assumed that a germ has a much greater probability of capturing a particle than of loosing one. In contrast to this we estimated above that a cluster has a much greater probability for loss than for capture. As now the assumption of this contrast is necessary to explain the kinetics we arrive at the conclusion, that a "germ" is qualitatively different from a "cluster". It is as if by capturing its last particle the germ falls into a potential well, which it only with difficulty can leave. By closer consideration of the circumstances one gets the impression that electrostatic forces are not sufficient to explain the formation of germs, but that other not so evident forces must come into play.

The further fate of the germs, when once they have been "born" is of course to grow by capturing new particles, until eventually the ionproduct of the solution has reached the saturation value.

Returning finally to the velocity expression it is seen that the product $x_5^0 w_5$ must be of the form $k_6 \, a^4 b^2$ or if we define c as the third root of the ionproduct $a^2 b$:

$$s = k_6 c^6$$

It is this formula which by integration yields an expression of the form

$$t_a \; c_0^5 = k_a$$

which was discussed in a previous note.

It must be added that both the experiments and the calculations hitherto applied are very crude, so crude that even changes in the orders of the different germs are not quite excluded, but such changes would not affect the general results which are that the size (order) of crystal germs can be determined by kinetical experiments and that the germs are far less than hitherto has been assumed.

Experimental and theoretical work on the problem is being continued.

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A Preliminary Report on the Synthesis of Taurine and Cystamine labelled with Radioactive Sulfur

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Taurine, free and in combination with the cholic acids, has been demonstrated to exert a series of physiological, pathological and pharmacological actions. In order to investigate its metabolism and some of the above functions by means of isotopic methods, a synthesis for the labelling of this compound with radioactive sulfur has been worked out. The labelled taurine will then be combined with the cholic acids by chemical or biological synthesis.

The formation of taurine from L(+)-cysteine through L(−)-cysteic acid has been demonstrated to take place in the animal organism [1], [2]. Certain findings,

such as the lack of cysteic acid decarboxylase in some animals known to produce taurine, indicates, however, that taurine might be formed in another manner. Its possible formation from 1-amino-2-mercapto ethane will be investigated by means of this compound labelled with radioactive sulfur.

The syntheses of taurine described in the literature have been critically studied and found unsuitable for its labelling with radioactive sulfur [3-12]. We therefore have worked out the following synthesis, which has been found suitable for semi-micro work and which gives an overall yield of approximately 50 per cent from the sulfur of thiocyanate.

The conversion of labelled sulfate to thiocyanate may be performed according to Wood (1947) [13]. The thiocyanate is reacted with 1-benzoylamino-2-brom ethane. The latter is prepared by benzoylating the hydrobromide of 1-amino-2-brom ethane in dry pyridine. The reaction

$$SCN^- + C_6H_5CONHCH_2CH_2Br = Br^- + C_6H_5CONHCH_2CH_2SCN$$

proceeds smoothly in 100 per cent ethanol at 50 degrees C with an average yield of 90 per cent. The resultant 1-benzoylamino-2-thiocyanate of ethane melts after recrystallisation from aqueous ethanol at 80° C (uncorr.) and forms small, white crystalline needles.

On hydrolysis of the 1-benzoylamino-2-thiocyanate of ethane with 2 eqv. of potassium hydroxide and the simultaneous oxidation of the mercaptan formed to the disulfide by bubbling air through the alcoholic solution, the dibenzoyl-cystamine of m.p. 132.5° C (uncorr.) is formed in almost quantitative yield. This is hydrolyzed to cystamine by boiling with 22 per cent hydrochloric acid, and can be either reduced to the hydrochloride of 1-amino-2-mercapto ethane, or oxidized according to Schöberl [14] to taurine in about 60 per cent

yield. The taurine separates on the addition of ethanol to the aqueous solution as typical crystalline needles of m. p. 228—230° C.

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The Structure of Acetaldehyde-ammonia, and a Note on its Anhydrous Form

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Acetaldehyde-ammonia (m. p. 94—96° C) crystallizes in the rhombohedral space group $D_{3d}^5 - R\bar{3}m$. [1, 2]. The hexagonal lattice constants as determined by the author are: $a = 11.29$ Å, $c = 15.86$ Å. There are 18 units of $CH_3 \cdot CHO \cdot NH_3$ in the hexagonal unit cell. The 18-fold position of this space group is a special one, involving a symmetry plane, whereas the 6-fold position requires the point symmetry $C_{3v} - 3m$.

According to an X-ray investigation carried out by Moerman [2] the solid com-