XLIII.—*Note on Two Molecular Compounds of Acetamide.*

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During the course of some experiments described in the foregoing paper (this vol., p. 411) upon the action of ethylene dibromide on sodium acetamide in presence of alcohol, a peculiar crystalline compound was isolated from the alcoholic solution after the reaction was over. The sodium bromide which separates during the change was filtered off, and the filtrate cooled or evaporated in a vacuum. In this way, long, colourless needles separated, which were at first mistaken for a condensation product of some kind, but always appeared to contain sodium bromide as impurity. Repeated crystallisation from alcohol, however, showed that the inorganic salt was not removed, and was an essential constituent. On investigation, the substance proved to be simply a well-defined molecular compound of the composition $2CH_3{\cdot}CO{\cdot}NH_2,NaBr$.

Similar experiments with alkyl iodides resulted in the formation of the corresponding, but much more soluble, compound, $2CH_3{\cdot}CO{\cdot}NH_2,NaI$.

These products are thus analogues of acetamide hydrochloride, $2CH_3{\cdot}CO{\cdot}NH_2,HCl$, and as no previous account of them appears to have been given, they were examined more closely. Both may be readily obtained directly from their constituents.

Acetamide Sodium Bromide, $2CH_3{\cdot}CO{\cdot}NH_2,NaBr$.—Powdered sodium bromide (1 mol.) and acetamide (2 mols.) are together boiled in five times their weight of absolute alcohol for about 3 hours. The bromide gradually dissolves, but not completely. On filtering hot and allowing to evaporate in a vacuum, or, better, by adding benzene, beautiful, long, white, glistening needles separate in feathery growths. The crystals, which are very deliquescent, may be dried in a vacuum, but not by heating, which causes dissociation, and they may be recrystallised from alcohol. When pure, it melts at 144—145° with separation of sodium bromide. On titration with $N/10$ $AgNO_3$:

0·3792 gave 0·1754 NaBr. NaBr = 46·2.

$2CH_3{\cdot}CO{\cdot}NH_2,NaBr$ requires NaBr = 46·6 per cent.

It begins to dissociate even at 100°, giving a crystalline sublimate of exceptionally pure acetamide (m. p. 83°), sodium bromide remaining. When dissolved in water, treated with chloroplatinic acid, and allowed to stand in the cold, the acetamide suffers gradual hydrolysis, and beautiful, large, ruby-red octahedra separate, consisting of an isomorphous mixture of $(NH_4)_2PtBr_6$ and $(NH_4)_2PtCl_6$.

Acetamide Sodium Iodide, $2CH_3 \cdot CO \cdot NH_2, NaI$, is formed similarly to the above. Sodium iodide (anhydrous) dissolves more readily and completely than the bromide in an alcoholic solution of acetamide. The double compound is very soluble, and therefore the minimum quantity of alcohol should be used. On allowing the syrupy solution to stand in a vacuum, it crystallises out in beautiful, large, flat prisms, which are excessively deliquescent. It melts at about 110°, with separation of sodium iodide. On titration with $AgNO_3$:

0·1942 gave 0·01088 NaI. NaI = 56·00.

$2CH_3 \cdot CO \cdot NH_2, NaI$ requires NaI = 55·98 per cent.

Attempts were made to prepare similar compounds with sodium chloride and with potassium haloids, but without success.

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