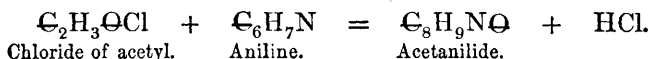


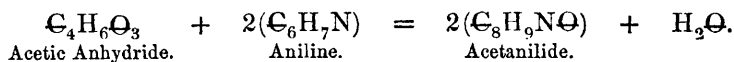
XIII.—*On Acetanilide.*

By C. GREVILLE WILLIAMS, F.R.S.

ACETANILIDE is one of the numerous substances formed by Gerhardt in 1852, by acting with the anhydrides of the monobasic acids, or the chlorides of their radicles, upon certain primary monamines. The reactions by which it is produced are sufficiently simple :



Or,



The above reactions are the only ones given in the Handbooks, but it is evident that to enable the decompositions of acetanilide to be studied minutely, some simpler process must be resorted to.

I found, in the beginning of last year, that the substance in question may be prepared in any quantity, and with extreme readiness, by cohobating aniline with strong acetic acid. The decomposition, of course, consists merely in the expulsion of water from the salt in accordance with the annexed equation :—



But why acetate of aniline should so readily become dehydrated in the presence of water is not very clear.

On boiling the product of the reaction with water, and filtering the solution while hot, the compound is deposited on cooling in small crystals of perfect purity.

Another method consists in boiling the materials together for some time, and distilling until the product begins to solidify in the neck of the retort. The receiver being then changed, the acetanilide will distil over perfectly colourless. The neck of the retort must be kept very hot, to prevent the product from solidifying, and stopping it up. The first preparation I made in this manner gave the annexed numbers on combustion with chromate of lead.

0.2483 gramme gave 0.6506 carbonic acid and 0.1552 water. The formula, $\text{C}_8\text{H}_9\text{NO}$, requires the following numbers :—

Experiment.		Calculation.			
Carbon.	71.46	71.11	C_8		96
Hydrogen	6.94	6.67	H_9		9
Nitrogen	—	10.37	N		14
Oxygen	—	11.85	O		16
		100.00			135

On boiling equal equivalents of ordinary glacial acetic acid and aniline together for one hour, and subsequently distilling, a quantity of the pure product will be obtained about equal in weight to the acid used.

I have lately been informed by Mr. Perkin, that acetanilide sometimes accompanies the crude aniline prepared on the large scale by Béchamp's process, especially if the acid used be very strong and in large excess.

Acetanilide presents itself, either as a white paraffin-like solid, or in small colourless plates, according as it has been obtained by distillation, or by crystallisation from water. It has a faint and characteristic odour. It melts at 100°C . according to Gerhardt, or at 101° according to my observations. The specific gravity of the fused product I found to be 1.099 at $10^\circ.5$.

It distils, as Gerhardt has stated, without decomposition. I find the boiling point to be 295°C ., the atmospheric pressure at the time being 755 millimetres.

I have made two careful determinations of its vapour-density upon a very pure product. Owing to its extremely high boiling point, it was necessary to heat the balloon in an atmosphere of mercury-vapour, as suggested by M. H. Sainte Claire-Deville.

	I.	II.
Excess of weight of balloon..	0·1431 grm.	0·1412 grm.
Temperature of vapour.....	350°	350°
Temperature of air	16°	16°
Pressure	755 millimetres	766 mm.
Capacity of balloon	92 cc.	92·5 cc.
Residual air	0·5 cc.	0·25 cc.
Density	4·887	4·807
Mean.	Calculation* (2 vols).	
4·847	4·671	

Although acetanilide bears the temperature of the boiling point of mercury as well as almost any organic substance, it nevertheless leaves a brownish residue in the balloon. This residue does not dissolve when the acetanilide is removed by means of alcohol. It is also insoluble in benzol, but may readily be removed by strong sulphuric acid.

Acetanilide dissolves readily in alcohol, ether, benzol, and essential oils. From a hot solution in lemon-oil it crystallises on cooling in large and beautiful needles. The alcoholic solution is not precipitated by water.

It dissolves very readily in warm sulphuric and hydrochloric acids. In nitric acid, kept cold, it also dissolves, with formation of β nitraniline.† The nitro-compound is precipitated on addition of water.

Decomposed at a high temperature by means of sodium, acetanilide yields a considerable quantity of aniline, and a minute portion of basic oil of high boiling point, not yet fully examined.

From the facility with which acetanilide may now be prepared in any quantity, and at little cost, it will doubtless become the starting point of numerous researches.

* $H_2O = 2$ vols.

† This reaction has been employed in researches by Dr. Hofmann and Mr. Mills.

