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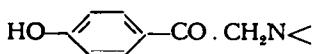
# A NEW SYNTHESIS OF $\omega$ -AMINO-*p*-HYDROXYACETOPHENONES AND THEIR REDUCTION TO THE CORRESPONDING AMINOETHANOLS

BY

M. ASSCHER \*)

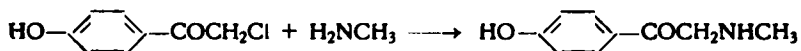
(Chemical Laboratory, N.V. Philips-Roxane, Weesp).

A new synthesis is described of compounds of the type



by the condensation of phenol or its derivatives with aminoacetonitriles according to the method of *Hoesch* and *Houben*. The corresponding alcohols are prepared by catalytic reduction of the ketones obtained.

One of the most commonly used methods of preparing  $\omega$ -amino-*p*-hydroxyacetophenones is the condensation of the  $\omega$ -halogen-*p*-hydroxyacetophenone derivatives with secondary or primary amines or with ammonia <sup>1)</sup> <sup>2)</sup> <sup>3)</sup>; for example:



The aminoketones which are thus formed can most easily be hydrogenated catalytically to the corresponding aminoethanols. The preparation of  $\omega$ -amino-*p*-hydroxyacetophenones in this way has the disadvantage that the  $\omega$ -halogen-*p*-hydroxyacetophenone derivatives can only be obtained via several intermediate steps <sup>4)</sup>.

We have now succeeded in finding a simple method of preparation of  $\omega$ -amino-*p*-hydroxyacetophenones by applying the condensation of nitriles and aromatic compounds, with the help of gaseous HCl and

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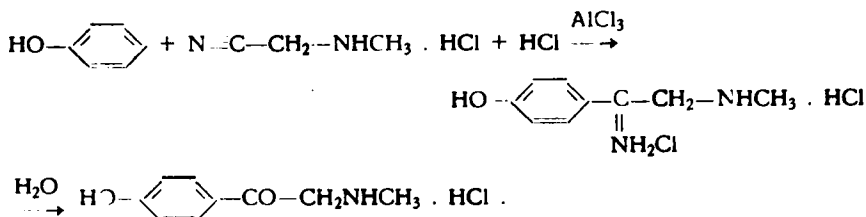
<sup>1)</sup> *H. Legerlotz*, D.R.P. 518.636; D.R.P. 520.079; *Friedländer* 17, 2517, 2519 (1926); U.S.P. 1.680.055.

<sup>2)</sup> *F. Stolz*, *Ber.* 37, 4149 (1904).

<sup>3)</sup> *J. R. Corrigan, M. J. Langerman and M. L. Moore*, *J. Am. Chem. Soc.* 67, 1894 (1945).

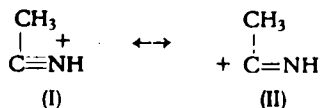
<sup>4)</sup> *H. M. Priestley and E. Moness*, *J. Org. Chem.* 5, 355—361 (1940).

$\text{ZnCl}_2$  or  $\text{AlCl}_3$  <sup>5)</sup> according to *Hoesch* and *Houben* <sup>6)</sup> to phenol or phenol derivatives and aminoacetoneitriles (or their salts), for example:



*Sonn* and *Falkenheim* <sup>7)</sup> condensed the acylaminonitriles carbethoxy- and benzoylaminoacetoneitrile with resorcinol, using ether as solvent and  $\text{ZnCl}_2$  as condensing agent, and obtained the corresponding  $\omega$ -acylaminoresacetophenones. The  $\omega$ -carbethoxyaminoresacetophenone, upon acid hydrolysis, gave  $\omega$ -aminoresacetophenone. The benzoyl derivative could not be hydrolyzed under the same circumstances <sup>7)</sup>. Non-acylated aminonitriles however have not been used until now in the reaction of *Hoesch* and *Houben*.

In the experiments of *Houben* and coworkers it was found that halogen-substituted acetoneitriles were more suitable for condensation than acetoneitrile. Under comparable reaction conditions trichloroacetoneitrile always gave the best yield <sup>6)</sup>. *Houben* gives no explanation of this fact. In our opinion the above results can be explained as follows. The nitrile first adds a proton and thus becomes a nitrilium ion <sup>8)</sup>. This nitrilium ion is an electrophile reagent whose electron distribution can be represented by the two following extreme contributing structures, between which there is resonance:



Those substituents on the  $\alpha$ -C-atom which increase the contribution of the extreme structure II to the actual state of the molecule, will promote the *Hoesch-Houben* reaction. This will in general be the case with electronegative substituents, for instance halogen or the ammonium group; these will of course make the nitrilium carbon atom still more positive.

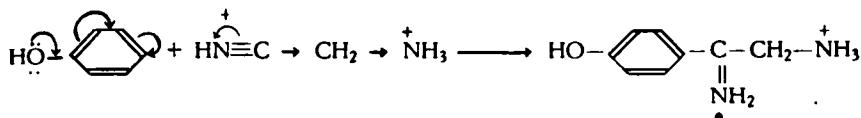
<sup>5)</sup> K. *Hoesch*, Ber. 48, 1122 (1915); 50, 462 (1917).

<sup>6)</sup> J. *Houben*, Ber. 59, 2878 (1926); J. *Houben* and W. *Fischer*, J. prakt. Chem. (2) 123, 266 (1929); Ber. 66, 341 (1933).

<sup>7)</sup> A. *Sonn* and S. *Falkenheim*, Ber. 55, 2981 (1922).

<sup>8)</sup> A. *Hantzsch*, Ber. 64, 667 (1930).

In this way the good results with the salts of aminoacetonitriles are probably to be explained. The reaction scheme then becomes



In this interpretation \*) of the *Hoesch-Houben* reaction (see equation) the part played by solvent and catalyst is left out of consideration.

In the condensation here described of phenol and phenol derivatives with amino-acetonitriles and their salts under the influence of  $\text{AlCl}_3$  and gaseous  $\text{HCl}$ , nitrobenzene was found to be the most satisfactory of the solvents examined, because, among other reasons, the reaction then takes place in a homogeneous medium.

The preparations of *p*-hydroxy- $\omega$ -amino-, *p*-hydroxy- $\omega$ -methyl-amino- and *p*-hydroxy- $\omega$ -isopropyl-aminoacetophenones give good yields.

The following nitriles were used with positive results: amino-, methylamino-, isopropylamino-, diethylamino- and methylbenzylamino-acetonitrile. The hydrochlorides of  $\alpha$ -methylaminopropionitrile,  $\beta$ -methylaminobutyronitrile <sup>9)</sup>,  $\alpha$ -aminoisovaleronitrile <sup>10)</sup>,  $\alpha$ -amino- $\alpha$ -phenylpropionitrile <sup>11)</sup> and *N*-benzoylmethylaminoacetonitrile gave no results upon condensation with phenol and anisole.

The hydrogenation of the *p*-hydroxy- $\omega$ -amino-acetophenones to the corresponding secondary alcohols was carried out at ordinary pressure and temperature with Raney nickel, with palladium monoxide to which a small quantity of platinum oxide was added and with palladium precipitated on carbon. Hydrogenation experiments were carried out only with hydrochlorides and neutral tartrates of the bases. The yields were between 70 and 88 percent. The aminoalcohols formed are, as was to be expected, considerably stronger bases than the corresponding aminoketones.

### Experimental Part.

The hydrochlorides of all aminonitriles were prepared according to the directions of *Biltz* and *Slotta* <sup>10)</sup> for methylaminoacetonitrile hydrochloride. The condensations were carried out at a temperature between 20 and 40°. Diethylaminoacetonitrile and methylbenzylaminoacetonitrile reacted slowly (upon working up, unchanged nitrile could be recovered) and required a higher reaction temperature.

\*) We are grateful for the valuable suggestions of Drs. J. de Jong.

<sup>9)</sup> P. Bruylants, Bull. soc. chim. Belg. 32, 256 (1923).

<sup>10)</sup> H. Biltz and K. Slotta, J. prakt. Chem. (2) 113, 252 (1926).

<sup>11)</sup> J. Jawelow, Ber. 39, 1195 (1906); Org. Synth. 24, 9 (1944).

***p*-Hydroxy-*o*-isopropylaminoacetophenone hydrochloride<sup>3)</sup>.**

13.5 g of isopropylaminoacetonitrile hydrochloride (0.1 mol.) and 14 g of phenol (0.15 mol.) is added to a solution of 33 g of powdered anhydrous aluminium chloride in 60 g of nitrobenzene. Dry HCl gas is passed through for three hours, while the temperature is kept between 30 and 40° C. With cooling and shaking the reaction mixture is carefully poured out into 100 cm<sup>3</sup> water. After standing for one hour the precipitate formed is filtered out with suction and washed with acetone. After recrystallization of the precipitate from water (treat with some charcoal) and working up of the mother liquor, 14 g of pure *p*-hydroxy-*o*-isopropylaminoacetophenone-HCl is obtained.

M.p.: 258—260° (decomp.).

Cl content found (Mohr): 15.47 %.

Calc. for C<sub>11</sub>H<sub>16</sub>O<sub>2</sub>NCl: 15.44 %.

**Isopropylaminoacetonitrile hydrochloride.**

The preparation is in the main analogous to that of methylaminoacetonitrile-HCl, cf. Biltz and Slotta<sup>10)</sup>. Several slight modifications were however introduced<sup>12)</sup>.

73 g of isopropylamine-HCl (0.764 mol.) are dissolved in 98 g of a 40 percent solution of formaldehyde. With stirring and cooling with a mixture of alcohol and solid carbon dioxide, a solution of 36.5 g of sodium cyanide in 75 cm<sup>3</sup> of water is added drop by drop at a rate such that the temperature remains between —4 and 0°. After standing for an hour at room temperature the nitrile formed (the upper layer of the reaction mixture) is diluted with benzene; the benzolic solution is separated, the aqueous layer extracted twice with benzene and the combined extracts dried with anhydrous sodium sulphate. The solution is freed of benzene in vacuo (max. temp. 70° C).

Yield: 67 g of isopropylaminoacetonitrile (89 %) as light yellow, slightly viscous oil with a characteristic nauseating odour. The nitrile cannot be purified by distillation, not even under diminished pressure.

To 67 g of nitrile in 30 cm<sup>3</sup> of absolute alcohol a solution of 25 g of dry HCl in 60 g of absolute alcohol is added slowly, drop by drop, with cooling in a mixture of ice and salt, vigorous stirring and exclusion of moisture. The temperature may not rise above 5 to 8°. 200 cm<sup>3</sup> of dry ether is then added. After shaking, the mixture is allowed to stand overnight and then the precipitate formed is filtered off with suction and dried in vacuo. Yield: 58 g isopropylaminoacetonitrile-HCl (64 %), m.p.: 166—167°.

Found Cl (Volhard): 25.93 %.

Calc. for C<sub>6</sub>H<sub>11</sub>N<sub>2</sub>Cl: 26.35 %.

This salt is pure enough for the condensation. After a single recrystallization from a mixture of alcohol and methylethylketone it is quite pure, in the form of thin glittering needles, m.p.: 168—169°.

Cl-content: 26.18 %.

***p*-Hydroxy-*o*-methylaminoacetophenone<sup>3)</sup>.**

30 g of anhydrous powdered aluminium chloride is dissolved in 60 g of dry distilled nitrobenzene (heat development). After cooling, 14 g of phenol (0.15 mol.) and 11 g of methylaminoacetonitrile-HCl<sup>10)</sup> (0.1 mol.) is added all at once with shaking. With stirring and exclusion of moisture a not too slow current of dry HCl is passed

<sup>12)</sup> A. Skita and F. Keil, Ber. **61**, 1688 (1928).

through the solution for three hours, while the temperature is kept between 20 and 30°. Then, carefully, with continual shaking and cooling with water the reaction-mixture is poured out into 70 cm<sup>3</sup> of water. After complete cooling under the tap and allowing to stand for one hour, the precipitate formed is filtered with suction and washed with acetone. It consists of a mixture of crystallized aluminium chloride and *p*-hydroxy-*o*-methylaminoacetophenone-HCl (together 25 to 30 g). It is dissolved in 300 cm<sup>3</sup> of water, 30 g of 50 percent sodium lactate solution is added (to bind the aluminium in a complex form), and after treatment with charcoal when hot, filtering and complete cooling, ammonia is added until the reaction is just alkaline (pH 8). The originally colourless solution becomes light brown and a precipitate is formed of small glittering white leaflets. After filtering with suction this is washed with water and a little acetone and dried in the air.

Yield: 12.5 g of *p*-hydroxy-*o*-methyl-aminoacetophenone in the form of glittering white crystalline powder (75 % yield). M.p.: 142—144° (decomp.). Upon carrying out the reaction at 50—55° the yield falls to 56 %.

When the base is dissolved in a slight excess of dilute hydrochloric acid, treated with charcoal, the solution evaporated to dryness in a vacuum and the crystalline residue rinsed on the filter with acetone, one obtains, after drying in the air, the pure hydrochloride (83 % yield). This can be recrystallized from 20 percent hydrochloric acid. M.p.: 242—244° (decomp.).

Found Cl (Mohr): 17.55 %.

Calc. for C<sub>9</sub>H<sub>12</sub>O<sub>2</sub>NCl: 17.59 %.

The poor solubility of the hydrochloride in hydrochloric acid medium makes easy its isolation out of the reaction mixture after the condensation.

By carrying out the same reaction with methylaminoacetonitrile sulphate (from the nitrile in alcohol with the calculated amount of concentrated sulphuric acid dissolved in alcohol, m.p.: 165—166° (decomp.); found: 40.59 % SO<sub>4</sub>; calc. for neutral sulphate: C<sub>8</sub>H<sub>11</sub>N<sub>2</sub>SO<sub>4</sub>: 40.33 % SO<sub>4</sub>), a 45 percent yield is obtained of *p*-hydroxy-*o*-methylaminoacetophenone.

The experiment here described carried out with methylaminoacetonitrile-HCl, while, after passing HCl through for five hours, the mixture is allowed to stand for six days before it is poured out into water, gives a 75 percent yield of the aminoketone. When no HCl gas at all is passed through and the mixture worked up after standing for three hours or even after six days, the yield falls to 25 percent of the theoretical.

By saturating a solution of 7 g (0.1 mol.), of methylaminoacetonitrile in 52 g of chlorobenzene with HCl gas, after which 10.5 g of phenol and 26 g of aluminium chloride are added, one obtains, after passing HCl through for seven hours and working up in the manner described above, 3.2 g of aminoketone.

The *N*-acetyl-compound is obtained by boiling the aminoketone with acetic anhydride for a moment and then pouring the mixture out into water. The precipitate is filtered by suction and recrystallized from a large volume of water, m.p. 191.5—192.5°.

Found: N 6.98 %, C 64.09 %, H 6.11 %.

Calculated for C<sub>11</sub>H<sub>13</sub>O<sub>3</sub>N: N 6.83 %, C 64.42 %, H 6.34 %.

*p*-Hydroxy-*o*-aminoacetophenone<sup>13)</sup> is prepared according to the directions for *p*-hydroxy-*o*-methylaminoacetophenone, by the condensation of phenol and aminoacetonitrile-HCl<sup>13)</sup>. Yield 51 percent. M.p. hydrochloride: 249—251°.

<sup>13)</sup> Org. Synth. Coll. Vol. I, 347 (1932); Houben-Weyl, Methoden der org. Chem., Bd. 4, 336 (1930).

Found Cl (Mohr): 18.84 %.

Calc. for  $C_8H_{10}O_2NCl$ : 18.90 %.

***p*-Benzoyloxy- $\omega$ -methylaminoacetophenone hydrochloride.**

By condensing phenyl benzoate with methylaminoacetonitrile-HCl according to the above directions (HCl gas passed through for 8 hours, the last quarter of an hour at 60°), pouring out into water with cooling, adding sodium lactate solution to the aqueous layer which has been treated with charcoal, and making just ammoniacal, a precipitate of impure *p*-benzoyloxy- $\omega$ -methylaminoacetophenone is obtained. The dried aminoketone is treated with 30 percent alcoholic hydrochloric acid and the hydrochloride formed is crystallized by the addition of methylethylketone. After filtering by suction and recrystallization from alcohol-methylethylketone a small yield of the pure hydrochloride is obtained.

M.p. 243—245° (decomp.).

Found: C 62.88 %, H 5.18 %, Cl 11.75 %.

Calc. for  $C_{16}H_{18}O_3NCl$ : C 62.90 %, H 5.23 %, Cl 11.60 %.

***p*-Methoxy- $\omega$ -methylaminoacetophenone hydrochloride.**

64 g of anisole and 44 g (0.4 mol.) of methylaminoacetonitrile-HCl is added to a solution of 108 g of anhydrous aluminium chloride in 240 g of nitrobenzene. Dry HCl gas is then passed through for six hours, the temperature being kept between 20 and 30°. With stirring and cooling under the tap the solution is poured out into 250 cm<sup>3</sup> of water. After cooling to 0° the fine precipitate formed is filtered by suction, stirred up with acetone, again filtered and dried, heated for five hours in vacuo to 100—120° and powdered. The dry powder is then extracted with ½ liter of absolute alcohol for four hours. After cooling to 0° the hydrochloride of *p*-methoxy- $\omega$ -methylaminoacetophenone crystallizes out of the extract. After recrystallization from absolute alcohol: 38 g of pure hydrochloride \*).

M.p.: 211—214° (decomp.).

Found Cl: 16.54 % (Mohr).

Calc. for  $C_{10}H_{14}O_2NCl$ : 16.45 %.

Upon heating 0.5 g of this hydrochloride for two hours at 150° with 2 cm<sup>3</sup> of a 48 percent solution of hydrogen bromide and making it alkaline with ammonia, a yield of 80 per cent of *p*-hydroxy- $\omega$ -methylaminoacetophenone is obtained.

***p*-Hydroxy- $\omega$ -methylbenzylacetophenone<sup>12)</sup>.**

When 9.3 g of phenol and 13.1 g of methylbenzylaminoacetonitrile-HCl are condensed with the help of 22 g of  $AlCl_3$  in 40 g of nitrobenzene by passing HCl gas through the mixture, and the reaction mass is treated as in the preparation of *p*-benzoyloxy- $\omega$ -methylaminoacetophenone, one obtains, after purification of the aqueous layer with charcoal, adding 100 g of 50 percent sodium lactate solution and making just alkaline with ammonia, a precipitate of 4½ g of crude *p*-hydroxy- $\omega$ -methylbenzylaminoacetophenone. The substance could be purified by recrystallizing it twice from dilute alcohol. M.p.: 102—110° (foaming).

Found: C 70.61 %, H 6.85 %, N 5.13 %.

Calc. for  $C_{16}H_{17}O_2N \cdot 1 H_2O$ : C 70.32 %, H 6.96 %, N 5.13 %.

The substance is thus a hydrate. M.p. of the hydrochloride: 223—225°.

\*) This hydrochloride is readily soluble in hydrochloric acid medium. It is therefore probable that under the conditions described it is not all isolated. Because of the great instability of the free base it is impossible to separate the latter from the aqueous solution of the hydrochloride by making it alkaline.

*Methylbenzylaminoacetonitrile* is prepared according to the directions for diethylaminoacetonitrile<sup>14</sup>).

Yield: 80 %; b.p. at 2 mm: 108—112°.

***p*-Methoxy-*ω*-diethylaminoacetophenone picrate.**

20 g of anisole and 15 g (0.1 mol.) of diethylaminoacetonitrile-HCl<sup>14</sup>) (m.p. 187—188°) is added to 33 g of AlCl<sub>3</sub> in 60 g of nitrobenzene. HCl gas is passed through for four hours at 35°, the mixture is poured out into 120 cm<sup>3</sup> of water and cooled. The aqueous layer is separated, extracted twice with carbon tetrachloride and treated with charcoal. The solution is then made so alkaline with strong alkali with cooling, that the aluminium hydroxide first precipitated is again dissolved. The oil which separates out is taken up in ethyl acetate, the water layer extracted three times with ethyl acetate, the ethyl acetate layer extracted five times with water and dried over sodium sulphate. A warm solution of 22 g of picric acid in ethyl acetate is added. After standing for six hours the product which crystallizes in fine yellow needles is filtered out with suction and washed with a little alcohol and ether.

Yield: 12 g of pure *p*-methoxy-*ω*-diethylaminoacetophenone picrate, m.p. 142—143° (can be recrystallized from ethyl acetate).

Found: C 50.84 %, H 4.95 %, N 12.35 %.

Calc. for picrate C<sub>18</sub>H<sub>22</sub>O<sub>9</sub>N<sub>4</sub>: C 50.67 %, H 4.89 %, N 12.44 %.

In an analogous experiment with phenol (HCl gas passed through for three hours at 25°) diethylaminoacetonitrile hydrochloride is found to react slowly. After the addition of water and sodium lactate solution and making ammoniacal, unchanged nitrile separates. After extracting with ether and treating with alcoholic hydrochloric acid, 10 percent of the amount originally used can be recovered as nitrile hydrochloride.

***p*-Hydroxy-*ω*-diethylaminoacetophenone hydrochloride<sup>1</sup>).**

This compound can best be prepared by demethylation of *p*-methoxy-*ω*-diethylaminoacetophenone, which can be obtained as the hydrochloride by extracting the solution in ethyl acetate (see above) with dilute hydrochloric acid and evaporating in vacuo the aqueous solution thus obtained to a syrupy consistency. (In this way the hydrochloride of *p*-methoxy-*ω*-diethylaminoacetophenone is not obtained in crystalline form. In the solid form it is extremely hygroscopic.) After the demethylation, which is accomplished by heating the syrupy residue with concentrated hydrochloric acid for three hours at 150° in a sealed tube, one evaporates to dryness in vacuo and purifies the crystalline residue by recrystallization from a mixture of alcohol and methyl ethyl ketone.

M.p.: 187—189° (decomp.). Legerlotz<sup>1</sup>) gives 194° as melting point.

Found Cl (Mohr): 14.53 %.

Calc. for C<sub>12</sub>H<sub>18</sub>O<sub>2</sub>NCl: 14.55 %.

This method of preparation is better than that by means of the reaction of phenol with diethylaminoacetonitrile hydrochloride.

Under conditions as described in the preparation of *p*-hydroxy-*ω*-methylaminoacetophenone we did not succeed in obtaining condensation between phenol and the following nitriles:  $\alpha$ -methylaminopropionitrile,  $\beta$ -methylaminobutyronitrile<sup>9</sup>),  $\alpha$ -amino-

<sup>14</sup>) Org. Synth. 27, 20 (1947); E. Knoevenagel and E. Mercklin, Ber. 37, 4089 (1904).

isovaleronitrile<sup>10</sup>),  $\alpha$ -amino- $\alpha$ -phenylpropionitrile<sup>11</sup>) and N-benzoyl-methylamino-acetonitrile.

For the nitriles of this group which are unknown or whose preparation is new, the experimental data are given in the following.

**N-benzoyl-methylaminoacetonitrile \***) can be prepared according to the directions of Klages and Haack<sup>15</sup>) for hippuric acid nitrile. The compound is found to be readily soluble in benzene and after drying the benzene solution, it can be precipitated with petroleum ether. After one recrystallization from a mixture of benzene—petroleum ether the melting point is 75—76°. Yield: 80 %.

**$\alpha$ -Amino- $\alpha$ -phenyl propionitrile hydrochloride.**

The nitrile is prepared according to Org. Synth. 24, 9, and isolated by taking it up in benzene and freeing it of solvent in vacuo. The nitrile residue, after treatment with alcoholic hydrochloric acid and evaporating in vacuo, gives a crystalline hydrochloride. After recrystallization from methylethylketone with a little alcohol, m.p.: 116—118° (sinters at 109°).

Jawelow<sup>11</sup>) gives as melting point 96—97°.

Found Cl (Volhard): 19.72 %.

Calc. for  $C_9H_{11}N_2Cl$ : 19.92 %.

**$\alpha$ -Methylaminopropionitrile hydrochloride.**

The nitrile can be obtained by condensation of acetaldehyde (30 percent aqueous solution), methylammonium chloride and sodium cyanide solution according to the directions for methylaminoacetonitrile<sup>10</sup>). It is isolated by extracting five times with ether, and after evaporation of the solvent in vacuo it can be converted into the hydrochloride with alcoholic hydrochloric acid. After recrystallization from alcohol-methylethylketone, glittering white leaflets, m.p. 124.5—125.5° (decomp.).

Found Cl (Volhard): 29.10 %.

Calc. for  $C_4H_9N_2Cl$ : 29.15 %.

**1-(*p*-hydroxyphenyl)-2-methylaminoethanol<sup>3</sup>).**

20.5 g of *p*-hydroxy- $\omega$ -methylaminoacetophenone is suspended in 100 cm<sup>3</sup> of water; 10 cm<sup>3</sup> of 36 percent hydrochloric acid is added. Solution is complete. After treating the solution with charcoal, it is shaken with hydrogen in the presence of a quantity of nickel catalyst prepared from 5 g of Raney alloy at ordinary pressure and temperature. After shaking for 12 hours no more hydrogen is taken up. The catalyst is filtered out with suction, and 13 cm<sup>3</sup> of 25 percent ammonia is added. 1-(*p*-hydroxyphenyl)-2-methylaminoethanol crystallizes out in the form of small white, faintly glittering needles which unite to balls. After standing for one hour they are filtered with suction, washed with a little water, alcohol and ether. Yield: 14.3 g (70 %).

M.p.: 186—187° (decomp.).

The hydrogenation can also be carried out with a mixture of palladium monoxide and 6 percent platinum oxide. After recrystallization of the aminoalcohol from 50 percent alcohol the melting point is 189.5—190.5° (decomp.).

Found: C 64.70 %, H 7.82 %, N 8.55 %.

Calc. for  $C_9H_{13}O_2N$ : C 64.70 %, H 7.79 %, N 8.38 %.

\*) The preparation of this substance and the subsequent condensation were carried out by Mr. P. Westerhof, to whom we express our sincere thanks.

<sup>15</sup>) A. Klages and O. Haack, Ber. 36, 1646 (1903).



Hydrogenation of 25 g of neutral *p*-hydroxy- $\omega$ -methylaminoacetophenone tartrate (m.p. 193—195°, decomp.) in water, in which it is difficultly soluble, with Raney nickel, after filtering out the catalyst, evaporating in vacuo to a syrup, adding 75 cm<sup>3</sup> of warm alcohol, cooling and filtering off the crystalline product, gives 22 g of 1-(*p*-hydroxyphenyl)-2-methylaminoethanol tartrate (88 % yield), m.p. 188—189° (decomp.).

**1-(*p*-hydroxyphenyl)-2-aminoethanol hydrochloride <sup>3</sup>).**

This compound can be obtained by the hydrogenation of *p*-hydroxy- $\omega$ -aminoacetophenone hydrochloride according to the above directions.

After no more hydrogen is taken up, the aqueous solution is evaporated and the residue recrystallized from alcohol-methylethylketone. A yield of 80 percent of the pure hydrochloride of the aminoalcohol formed is thus obtained, m.p. 177—179° (decomp.).

Found Cl (*Mohr*): 18.83 %.

Calc. for C<sub>8</sub>H<sub>10</sub>O<sub>2</sub>NCl: 18.70 %.

**1-(*p*-hydroxyphenyl)-2-isopropylaminoethanol <sup>3</sup>).**

This compound can also be obtained according to the above directions, beginning with *p*-hydroxy- $\omega$ -isopropylaminoacetophenone hydrochloride. After making ammoniacal, the yield of crystalline 1-(*p*-hydroxyphenyl)-2-isopropylaminoethanol (m.p. 136—138°) is 75 percent of the theoretical.

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