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PATENT



SPECIFICATION

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COMPLETE SPECIFICATION.

A New or Improved Process of Substituting Halogens for the Amino Groups in Aliphatic Amines.

We, the Firm CHEMISCHE FABRIK FLORA, of Dübendorf, Switzerland, Manufacturers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 According to this invention, amino groups are replaced by chlorine and bromine by treating aliphatic amines with a mixture of hydrochloric acid and nitric acid or a mixture of hydrobromic acid and nitric acid respectively. It appears that nascent chlorine and bromine eliminate the amino groups.

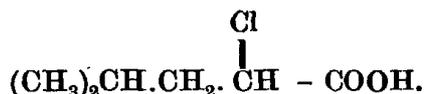
10 This is a novel reaction, surprising in view of the fact that the effect of concentrated nitric acid alone on amines is of a different kind, producing oxidation or the formation of nitramines or hydroxylic derivatives.

15 Prior methods of replacing aliphatic amino groups by chlorine and bromide include the use of nitrosyl-chloride or nitrosyl-bromide and of mixtures of sodium nitrite with hydrochloric or hydrobromic. As compared with these methods we find in practice that the invention has the advantage of being more convenient for manufacturing purposes.

The invention may be applied to any aliphatic amine and its salts, but from the technical point of view is most important in regard to the amino carboxylic acids.

20 **EXAMPLES.**

1. 50 grams of *l*-leucine are treated with 40 ccm. of concentrated hydrochloric acid (specific gravity 1.12) and 40 ccm. of concentrated nitric acid (specific gravity 1.4) the solution being heated in a water bath. The reaction proceeds most smoothly between 50° and 100° C. Violent evolution of nitrogen soon sets in, and is generally finished after heating for half an hour. An oil as clear as water is separated, consisting of nearly pure *l*- α -Chlorisobutyl-acetic acid.

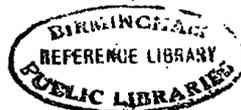


30 Chlorine observed:—23.17%. Chlorine calculated:—23.5%.

The compound is laevorotatory, the optical activity being, accordingly retained.

2. 60 grams of *l*-leucine are dissolved in 40 ccm. of hydrobromic acid

[Price 6d.]



(sp.gr. 1.4°) the solution is heated to between 50° and 100° C. in a water bath, and 40 ccm. of nitric acid (sp.gr. 1.49) are gradually added. Violent evolution of nitrogen indicates the course of the reaction. When this is finished the mass is cooled, resulting in separation, as oil of *l*- α -bromisobutyl-acetic

acid $(\text{CH}_3)_2\text{CH}.\overset{\text{Br}}{\text{CH}}_2.\text{CH} - \text{COOH}$. One fractional distillation *in vacuo* purifies the product. 5

3. 5 grams of *l*-aspartic acid are treated with 8 ccm. of nitric acid (sp.gr. 1.12) and 8 gr. of hydrochloric acid (sp.gr. 1.2) and heated to between 50° and 100° C. in a water bath. Evolution of nitrogen sets in, and is soon finished. On cool-

ing, a very good yield of *l*-chlorosuccinic acid $\text{HOOC} - \overset{\text{Cl}}{\text{CH}}_2.\text{CH}.\text{COOH}$ crystallizes out in a pure state.

In an analogous manner *l*-bromo succinic acid is derivable from *l*-aspartic acid, but no heating is required in this case. 15

Instead of using *ab initio* a mixture of nitric and hydrochloric acid, or nitric and hydrobromic acid, we may use a mixture which yields these two acids, for example a mixture of hydrochloric acid or hydrobromic acid with a nitrate or of nitric acid with a chloride or bromide.

The process is also applicable to salts, such as the copper and sodium salts, of amino-carboxylic-acids, for example alanine and other albumen builders. 20

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. The process of replacing amino groups by chlorine or bromine by treating aliphatic amines with a mixture of nitric and hydrochloric acid or nitric and hydrobromic acid. 25

2. The modification of the process claimed in Claim 1 wherein the amines are treated with mixtures of hydrochloric acid or hydrobromic acid and nitrates, or of nitric acid and chlorides or bromides, to wit with mixtures which yield hydrochloric or hydrobromic acid and nitric acid together. 30

3. The modification of the process claimed in Claim 1, wherein chlorine or bromine is substituted for the amino group in salts, such as the copper and sodium salts, of amino-carboxylic-acids, such as leucine, aspartic acid, alanine, and other albumen builders. 35

Dated this 25th day of August, 1919.

For the Applicants,

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