

## UNITED STATES PATENT OFFICE

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## CYCLOHEXYLAMINE DERIVATIVES

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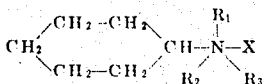
No Drawing. Application November 10, 1934, Serial No. 752,468

7 Claims. (Cl. 260—127)

This invention relates to new cyclohexylamine derivatives and more particularly refers to quaternary ammonium compounds derived from dialkyl cyclohexylamines and alkylating agents.

It is an object of this invention to produce useful compounds which were heretofore unknown. A further object is to produce new wetting, detergent, dispersing and emulsifying agents. A still further object is to produce compounds which are of particular value in the processing and treating of textile materials. A still further object is to produce compounds which may be substituted for or used in admixture with soap and/or soap-like products in the various industrial processes wherein such products were formerly used or are capable of use. Additional objects will become apparent from a consideration of the following specification and claims.

These objects are attained according to the herein described invention wherein a cyclohexylamine or a derivative thereof is reacted with an alkylating agent. In its preferred embodiment the present invention embraces the production and uses of compounds having the following general formula:



wherein N represents a quaternary ammonium nitrogen, R<sub>1</sub> and R<sub>2</sub> represent alkyl groups, R<sub>3</sub> represents a normal primary alkyl radical containing from 8 to 18 carbon atoms, and X represents a halogen group.

A more thorough understanding of this invention may be obtained by a consideration of the following illustrative example.

*Example*

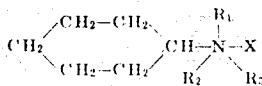
A mixture of 305 parts by weight of cetyl bromide and 127 parts of cyclohexyl dimethyl amine were heated at 90–100° until a sample formed a clear solution in water. This required about 24 hours. The time may be shortened by increasing the temperature but the product is then usually darker in color. The cetyl cyclohexyl dimethyl ammonium bromide was obtained as a light straw colored soapy or waxy substance, which foamed strongly in water. It was soluble in ether, alcohol, benzene, chloroform and warm acetone but almost insoluble in petroleum ether. This product was valuable as a mordant, as a protective agent and in many other applications.

As previously mentioned, the preceding exam-

ple is intended for purposes of illustration merely and is in no way to be construed as a limitation upon the scope of the present invention. In forming the desired products numerous other compounds may be used in place of or in addition to the cyclohexylamine derivative and/or the alkylating agent referred to in the aforementioned example.

For example, unsubstituted cyclohexylamines, mono-substituted and di-substituted cyclohexylamines, and di-cyclohexylamines may be selected. A few of the many compounds falling within this category are mono- and/or dimethyl-, -ethyl-, -propyl-, -butyl-, -isobutyl-cyclohexylamines. When di-alkyl cyclohexylamines are used the alkyl groups may be the same or dissimilar, and they may be straight chain and/or branched chain groups. Moreover, the cyclohexyl nucleus and/or alkyl groups attached to the amino nitrogen may be further substituted.

Many of the compounds produced by following the aforementioned instructions may be represented by the following general formula:



wherein N represents a quaternary ammonium nitrogen, R<sub>1</sub> and R<sub>2</sub> represent alkyl groups, R<sub>3</sub> represents an alkyl radical preferably containing at least 8 carbon atoms, and X represents an anionic group such as Cl, Br, SO<sub>3</sub>H, SO<sub>3</sub>CH<sub>3</sub>, CH<sub>3</sub>COO, CH<sub>3</sub>C<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>, etc.

The preferred class of compounds is obtained by reacting a dialkyl cyclohexylamine with an inorganic ester of an alcohol containing at least 8, and preferably from 12 to 18, carbon atoms. Such alcohols may be of either saturated or unsaturated origin, and may likewise be further substituted with groups such as hydroxyl, halogen, etc. Normal primary alcohols containing from 8 to 18 carbon atoms and mixtures of the same have been found to be quite satisfactory. These alcohols are, for example, octyl, decyl, lauryl, myristyl, cetyl, stearyl, oleyl, ricinoleyl and linoleyl alcohols. Esters produced by reacting the aforementioned alcohols and mixtures thereof with hydrobromic, hydrochloric and/or sulfuric acids are, in general, preferable. Such esters are the chlorides-, bromides- and sulfates of octyl, decyl, lauryl, myristyl, cetyl, stearyl, oleyl, ricinoleyl and linoleyl alcohols.

Reaction of the cyclohexylamine derivatives with the alkylating agents previously described, or suggested thereby, is advisably carried out at

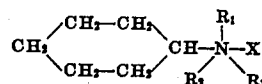
the lowest possible temperature. This temperature will vary with the particular compounds selected, although temperatures in the neighborhood of room temperature are frequently sufficient. Molecular equivalents of the reacting substances are usually preferred. However, it is not intended that the invention shall be restricted to stoichiometric proportions since it may be varied widely therefrom. The presence of solvents or diluents is usually optional. Such solvents or diluents are, for example, paraffin and aromatic hydrocarbons and ethers, alcohols of the aliphatic or aralkyl series including those previously referred to with respect to the production of esters, as well as their lower homologues and isomers.

The compounds described herein are of particular value as wetting, detergent, emulsifying and dispersing agents, especially where the esterifying radical contains at least 8 carbon atoms. These products, are also of considerable utility as stripping agents and as fixing agents for dyes. They have additional uses in place of or in admixture with soap and soap-like products in the various industrial processes where such products were formerly used. Likewise, the products may be converted into salts containing other anions, or into complexes such as by combination with zinc chloride, cadmium chloride, etc. Many of these derivatives are valuable as insecticides or in the production of pigments. Their free bases are useful as cellulose solvents, mercerizing agents, etc. These bases may readily be obtained from the halides by treatment with alkali in alcoholic solution or by treatment with silver oxide or from the methosulfates by hydrolysis with dilute sulfuric acid followed by precipitation of the sulfate ion with barium hydroxide or carbonate. A few of the additional uses are in the processing, dyeing and general treatment of textile materials, in the flotation of ores, in the production of cosmetics, pharmaceuticals, treatment of rubber, and the numerous products wherein wetting, emulsifying and dispersing agents are of value. It is to be understood that only an illustrative few of the many uses for which these compounds are adapted have been referred to supra. It is contemplated that these products or mixtures thereof may be used in any of the processes wherein prior art wetting, detergent and emulsifying agents have been used or are capable of use. Likewise, utilization of the aforementioned compounds in admixture with prior art wetting, detergent and emulsifying agents and/or assistants therefor is contemplated.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

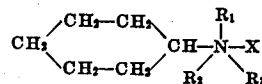
We claim:

1. A compound having the following general formula:



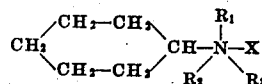
wherein  $R_1$  and  $R_2$  represent lower alkyl groups,  $R_3$  represents an unsubstituted alkyl radical containing at least 8 carbon atoms, and  $X$  represents an inorganic acid radical.

2. A compound having the following general formula:



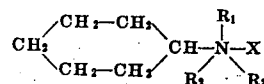
wherein  $R_1$  and  $R_2$  represent lower alkyl groups,  $R_3$  represents a normal primary alkyl radical containing from 8 to 18 carbon atoms, and  $X$  represents an inorganic acid radical.

3. A compound having the following general formula:



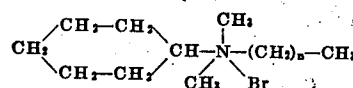
wherein  $R_1$  and  $R_2$  represent lower alkyl groups,  $R_3$  represents a normal primary alkyl radical containing from 8 to 18 carbon atoms, and  $X$  represents a halogen group.

4. A compound having the following general formula:



wherein  $R_1$  and  $R_2$  represent lower alkyl groups,  $R_3$  represents a normal primary alkyl radical containing from 12 to 18 carbon atoms, and  $X$  represents one of the group consisting of chlorine and bromine.

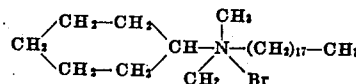
5. A compound having the following general formula:



wherein  $n$  represents one of the integers from 7 to 17.

6. Cetyl cyclohexyl dimethyl ammonium bromide.

7. A compound having the following formula:



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