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DETERGENT

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The invention relates to the use of long chain N-alkyl primary amine salts as emulsifying, suspending, wetting, and cleansing agents and as detergents.

It has until now been thought that the salts of long straight chain primary alkyl amines were worthless as wetting, emulsifying, and cleansing agents and as detergents, because it was known that the short chain alkyl amines free bases, such as methyl amine and n-amyl amine which have cleansing and detergent properties, are rendered worthless for these purposes when converted to salts such as the hydrochloride.

We have found, however, that the salts of n-alkyl primary amines containing from 10 to 18 carbon atoms have excellent emulsifying, wetting and cleansing properties and are useful as detergents. These properties coincide with very effective surface tension reducing properties of the salts of these amines and improve as the length of the chain is increased and are limited only by the lack of solubility in water as the chain is lengthened.

Those salts of amines containing less than 10 carbon atoms in the alkyl radical are not effective emulsifying, wetting and cleansing agents and the salts of n-alkylamines in which the alkyl group contains more than 18 carbon atoms are only slightly water-soluble and consequently are of little value as wetting and cleansing agents or as detergents.

The salts of our invention may be prepared by neutralization of the amines with mineral acids such as hydrochloric, sulfuric, sulfamic, phosphoric, etc. or organic acids may be used, such as acetic, citric or lactic, picric, etc. which form water-soluble salts of the amines.

The amine salts of the invention may be utilized for the ordinary uses of emulsifying, wetting and cleansing agents and as detergents. They have been found superior to ordinary emulsifying agents for the emulsification of mineral and vegetable oils and may be used to advantage for such purposes. They have excellent foaming, lathering and cleansing action as soaps for washing the hair, skin, fabrics, and for purposes of general cleaning.

Commercially they may be used alone or in mixtures with fillers, perfumes, coloring and other modifying agents commonly used in soap and detergent preparations. They can be made up in the form of liquids, powders, molded cakes and the like.

The various amine salt detergents of our invention can be used alone, or they can be mixed

together or otherwise combined in the same detergent preparations. Thus, it is possible commercially to obtain amine products consisting primarily of one, but also containing other, primary straight chain alkyl amines having 10 to 18 carbon atoms in the alkyl chain. Such mixtures of amine free bases can be converted to detergent salts and used in accordance with our invention in the same manner as the chemically pure amines.

The detergent amine salts of our invention are excellent emulsifying or suspending agents for water insoluble medicinal agents. They may also be used as soaps which serve as vehicles for water-soluble or water-insoluble medicinals.

The following examples are illustrative of the invention:

Example 1

A quantity of n-dodecyl amine is neutralized with sufficient dilute hydrochloric acid to make a 1% solution of n-dodecyl amine hydrochloride. Oil of lavender is added to give a concentration of 0.05% of this ingredient. The resulting solution is an excellent detergent for washing the hands, bathing, shampooing, washing fabrics and like cleansing operations. The oil of lavender can be omitted from this example, if desired, since it is not an essential ingredient for detergent action.

Example 2

A quantity of n-tetradecyl amine in ether solution is treated with the necessary amount of hydrogen chloride to neutralize the amine which precipitates out as the crystalline hydrochloride. This can be used directly as a detergent or can be purified, if this seems desirable, by recrystallization from alcohol or ether-alcohol or similar solutions in organic solvents.

1 lb. of n-tetradecyl amine hydrochloride is mixed thoroughly with $\frac{1}{2}$ grain of eosin dye and $2\frac{1}{2}$ cc. of rose geranium bouquet. The product thus obtained is an excellent soap powder, detergent, wetting agent, emulsifier and suspending agent for insoluble materials in finely divided form. The hydrochloride of n-tetradecyl amine when used alone is just as satisfactory as the final powder described, the eosin and rose geranium merely making the powder more suitable for toilet purposes.

Example 3

A quantity of n-hexadecyl amine in ether is exactly neutralized with the necessary quantity of glacial acetic acid. The acetate of n-hexadecyl

amine precipitates out when the solution is concentrated, for example, by distilling off part of the ether, and then cooling. The acetate can then be filtered off and dried. It has the formula $C_{18}H_{39}O_2N$ and is a very good detergent, emulsifier, and wetting agent.

Example 4

The compounds of our invention may be represented by the following formula, $RNH_2.HX$ where R is a primary straight-chain alkyl radical containing 10 to 18 carbon atoms and X is the anion of an acid capable of giving a water-soluble salt when reacted with the corresponding amine of formula RNH_2 .

Example 5

The compounds of our invention include the water-soluble mineral and carboxylic acid salts of the following primary straight-chain alkyl amines; decyl amine, undecyl amine, dodecyl amine, tridecyl amine, tetradecyl amine, pentadecyl amine, hexadecyl amine, heptadecyl amine and octadecyl amine and combinations of these amines.

What we claim as our invention is:

1. A non-alkaline detergent comprising a water-soluble salt of a primary straight-chain alkyl amine in which the alkyl group contains 10 to 18 carbon atoms.

2. A non-alkaline detergent comprising a hydrohalic acid salt of a primary straight-chain alkyl amine in which the alkyl group contains 10 to 18 carbon atoms.
3. A non-alkaline detergent comprising the hydrochloric acid salt of a primary straight-chain alkyl amine in which the alkyl group contains 10 to 18 carbon atoms.
4. A non-alkaline detergent comprising a low molecular carboxylic acid salt of a primary straight-chain alkyl amine in which the alkyl group contains 10 to 18 carbon atoms.
5. A non-alkaline detergent comprising the acetate of a primary straight-chain alkyl amine in which the alkyl group contains 10 to 18 carbon atoms.
6. A non-alkaline detergent comprising a water-soluble salt of n-dodecyl amine.
7. A non-alkaline detergent comprising the hydrochloride of n-dodecyl amine.
8. A non-alkaline detergent comprising the acetate of n-dodecyl amine.
9. A water-soluble salt of a primary straight-chain alkyl amine in which the alkyl group contains 10 to 18 carbon atoms.
10. N-dodecyl amine hydrochloride.

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DISCLAIMER

2,274,807.—*Albert L. Rawlins and Leon A. Sweet, Detroit, Mich.* DETERGENT. Patent dated March 3, 1942. Disclaimer filed June 11, 1942, by the assignee, *Parke, Davis & Company*.

Hereby enters this disclaimer to claims 9 and 10.

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