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LIQUID DETERGENT COMPOSITIONS

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ABSTRACT OF THE DISCLOSURE

Clear, homogeneous, all-purpose liquid detergent compositions consisting essentially of, by weight, (a) 3–6% alkylbenzene sulfonate, (b) 2–5% hydrotropic sulfonate of benzene or lower alkyl benzene, (c) 1.5–4% urea, (d) 1.5–4% fatty alkanolamide, (e) 3–8% alkali metal inorganic phosphate builder and (f) the balance water exhibit improved viscosity and low temperature clear point properties.

Built liquid detergents have become of significant importance in recent years and have found preference over dry powder formulations for various applications. Numerous aqueous detergent compositions are known in the art and are disclosed, for example, in U.S. Pat. Nos. 2,992,993; 3,175,977 and 3,320,173. In general, however, clear, homogeneous, relatively viscous liquid compositions are more commercially suitable than low viscosity liquids. All-purpose liquid detergents that are low in active detergent solid constituents, when compared, for example, with heavy duty liquids used for clothes laundering and dishwashing, generally exhibit lower viscosities than commercially desirable and usually require the addition of an inactive thickening agent.

In accordance with the present invention, there have been discovered clear, homogeneous aqueous liquid detergent compositions with improved viscosity properties consisting essentially of, by weight.

(a) A member of the group of alkyl toluene and alkylbenzene sulfonate detergents, from about 3% to 6%;

(b) Hydrotropic sulfonate of benzene or lower C_1–C_4 alkyl benzene sulfonate, from about 2% to 5%;

(c) Urea, from about 1.5% to 4%;

(d) Fatty acid alkanolamide in which the alkanol group may contain up to 8 carbon atoms, from about 1.5% to 4%;

(e) Alkali metal inorganic phosphate builder, from about 3% to 8%; and

(f) The balance water.

It has been found that the aforesaid combination of ingredients produce stable, clear and homogeneous liquid compositions of a surprisingly high viscosity, up to about 500 centipoises, due to the cooperative activity of urea, hydrotropic sulfonate and fatty alkanolamide, the presence of the aforesaid (b), (c), and (d) components being essential for the production of a high viscosity, stable, low clear point all-purpose formulation. Preferably the viscosity will be in the range of about 75 to 200 centipoises.

The alkyl benzene and toluene sulfonates employed in the compositions of the present invention are well known in the art as detergents and generally may have about 8 to 18 carbon atoms in the alkyl chain and are employed in the form of the alkali metal and ammonium salts. Especially preferred are sodium alkylbenzene sulfonates wherein the alkyl is a straight chain containing from about 12 to 18 carbon atoms. From about 3% to 6% by weight of the total aqueous composition and preferably from about 4% to 5% alkylbenzene sulfonate is employed in the liquid detergent compositions of the present invention.

The alkali metal inorganic phosphate builders useful in preparing the compositions of the present invention are well known and the concentration may vary from about 3% to 8% by weight, and preferably in the range of about 5% to 7%. These inorganic phosphates comprise the orthophosphates, polyphosphates, pyrophosphates and metaphosphates. Illustrative materials are sodium tripolyphosphate, tetrasodium pyrophosphate, trisodium phosphate, sodium hexametaphosphate, potassium hexametaphosphate, pentapotassium tripolyphosphate, and hexapotassium tetrapolyphosphate. Preferably the alkali metal phosphate builder employed in the composition of the present invention will be tetrapotassium pyrophosphate.

The hydrotropic sulfonate and urea are essential for the compatibilization of alkylbenzene sulfonate and inorganic phosphate; and in combination with the fatty acid alkanolamide for the production of a highly viscous final product.

The hydrotropic sulfonates useful herein are the alkali metal and ammonium sulfonates of benzene and lower C_1–C_4 alkyl benzenes such as sodium toluene sulfonate, sodium benzene sulfonate, sodium cumene sulfonate, sodium xylene sulfonate, potassium benzene sulfonate, potassium toluene sulfonate, potassium cumene sulfonate, as well as the ammonium benzene, toluene, cumene and xylene sulfonates. Especially preferable in preparing the compositions of the present invention is sodium xylene sulfonate. These hydrotropes are employed in amounts ranging from 2% to 5% and preferably about 3% to 4%. The quantity of urea will be from 1.5% to 4% and most suitably 2% to 3%, all of said percentages being by weight of the total aqueous composition.

The fatty acid alkanolamide is employed in quantities of from about 1.5% to 4% by weight and preferably 2% to 3%. In combination with the urea and hydrotrope it serves to produce a viscous aqueous system and also acts as a foam booster and stabilizer. The acyl radical of the alkanolamide is selected from the class of fatty acids having 10 to 18 carbon atoms, preferably 12 to 14 carbon atoms, and the alkanol group may have up to 4 carbon atoms in the case of monoalkanolamine derivatives and 8 carbon atoms in the case of dialkanolamine derivatives. Especially suitable and preferred are the diethanolamides. Illustrative of the fatty acid alkanolamides suitable for use in preparing the compositions of the present invention are oleic diethanolamide, tall oil fatty acid diethanol amide, linoleic acid diethanolamide, and the corresponding fatty acid amides of glycerol mono- and diamines, diisopropanolamine, aminoethylethanolamine, dibutanolamine and diisobutanolamine. These fatty acid alkanolamides may be prepared by various well known techniques such as by condensing equimolar quantities of fatty acid with alkanolamine, or by condensing a molar excess of alkanolamine with fatty acid or by reacting a fatty acid ester with alkanolamine, or by oxyalkylating, such as oxyethylating, the amide of the fatty acid.

The aqueous liquid detergent compositions of the present invention are prepared simply by combining the aforementioned ingredients with water at room temperature. No particular order of addition is necessary to produce the stable and viscous all-purpose composition useful for all hard surface cleaning applications. The novel liquid compositions described herein will generally have very low clear points, in the area of 0° C. and lower, and will retain clarity and stability upon storage for prolonged periods of time.

The following examples are illustrative of the practice of the present invention but are not to be considered as limitative of its scope. All percentages reported are by weight.

EXAMPLE I

An all-purpose liquid having a viscosity of 130 centipoises and a clear point less than 0° C. was prepared by combining the following:

	Percent
(a) Sodium dodecylbenzene sulfonate	4.5
(b) Sodium xylene sulfonate	3.6
(c) Urea	2.4
(d) Lauric diethanolamide	2.5
(e) Tetrapotassium pyrophosphate	6.0
(f) Water	81.0

EXAMPLE II

Example I was repeated except that no urea was employed and 6% sodium xylene sulfonate was used. The viscosity measured only 10 centipoises. (The viscosity of water is approximately 1 centipoise at room temperature.)

EXAMPLE III

Example I was repeated except that no fatty alkanolamide was added. The system had a viscosity of 23 centipoises.

EXAMPLE IV

Example I was again repeated except that no sodium xylene sulfonate was added and 6% urea was employed. The system was unstable and did not form a clear solution.

What is claimed is:

1. An aqueous liquid detergent composition having a viscosity of from 75 to 200 centipoises at room temperature and a clear point of about 0° C. consisting essentially of, by weight:

(a) sodium dodecyl benzene sulfonate, from about 4 to 5%;
(b) sodium xylene sulfonate, from about 3 to 4%;
(c) urea, from about 2 to 3%;
(d) lauric diethanolamide, from about 2 to 3%;
(e) tetrapotassium pyrophosphate from about 5 to 7%; and
(f) the balance water.

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