

[54] CLEANING COMPOSITIONS

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[57]

ABSTRACT

Stable, clear, non-flammable, water and organic solvent based foamable cleaning compositions comprising water, hydrocarbon solvent, chlorinated solvent, surfactant, organic solubilizing agent and builder.

1 Claim, No Drawings

CLEANING COMPOSITIONS

This invention relates to stable, clear, non-flammable, water and organic solvent based foamable cleaning compositions.

It is known that organic solvent based cleaners, apart from the flammable nature thereof, manifest very poor, if any, foaming action, a characteristic which detracts from their utility for removing soil and grease from vertical and overhead surfaces where retention of the cleaner is needed to provide adequate cleaning action. It is also known that water based cleaners containing salts which impart foaming properties to the cleaners have a low tolerance for organic solvents. It is further known that organic solvent based cleaners demonstrate a very low capacity for salts of the type usually employed in water based cleaners.

In accordance with the present invention compositions have been evolved which incorporate, in a single product, the excellent cleansing action of organic solvent based cleaners, and the cleansing and foaming action of water based cleaners. The compositions, furthermore, are non-flammable. In addition, they are clear and homogeneous in appearance, and remain stable for prolonged periods of time over a wide temperature range.

The water and organic solvent based foamable cleaning compositions of this invention contain, as essential ingredients, (1) water, (2) organic solubilizing agent, most advantageously a mixture of organic solubilizing agents, (3) surfactant preferably in the form of a mixture of a water soluble alkali metal salt or lower alkanolamine salt of a higher alkyl aromatic sulfonic acid and an alkali metal salt of a higher alkyl diphenyl ether sulfonic acid, (4) hydrocarbon solvent, (5) chlorinated solvent, and (6) inorganic builder. Supplemental materials of various types, referred to hereinafter, may be incorporated into the compositions but they are not essential.

The organic solubilizing agents utilized in the compositions include lower alkyl ethers of glycols and polyglycols exemplified by monomethyl ether of ethylene glycol, monoethyl ether of ethylene glycol, monobutyl ether of ethylene glycol, monobutyl ether of diethylene glycol, monoisopropyl ether of diethylene glycol, monobutyl ether of butylene glycol, and, as indicated above, most advantageously, mixtures of any of the foregoing ethers with glycols such as ethylene glycol, propylene glycol, hexylene glycol, heptylene glycol, and the like. In the latter case, a mixture comprising monobutyl ether of ethylene glycol and hexylene glycol is preferred. The proportions of solubilizer employed will range from about 3% to about 30%, usually about 10% to about 18%, by weight, of the composition. When the solubilizer comprises a mixture of an ether such as monobutyl ether of ethylene glycol and a glycol such as hexylene glycol, the proportion of ether desirably will range from about 1% to about 15%, and the glycol from about 2% to about 15%, by weight, of the composition.

The surfactants used in the compositions include water soluble alkali metal and lower alkanolamine salts of alkyl benzene or toluene sulfonic acids in which the alkyl group contains predominately from eight to 22 carbon atoms, especially predominately 12 to 16 carbon atoms. Particularly preferred are the alkali metal, especially sodium and potassium, and the lower alkanolamine salts of C_{12} to C_{16} benzene, toluene, ethyl

benzene and xylene sulfonic acids. The lower alkanolamines which are used to form the salts of the aforementioned sulfonic acids comprise diethanolamine, triethanolamine, di-isopropanolamine, triisopropanolamine, butanolamine, isobutanolamine, and the like. Of the foregoing, triethanolamine salts of alkyl benzene sulfonic acids are especially satisfactory. The surfactants having utility for the purposes of this invention also include alkali metal salts of alkyl diphenyl ether sulfonic acids in which the alkyl group has a number of carbon atoms corresponding to the carbon atoms in the alkyl group of the aforementioned alkanolamine salts. Exemplary of such alkali metal salts are sodium decyl diphenyl ether disulfonate, sodium dodecyl diphenyl ether disulfonate, sodium tetradecyl diphenyl ether disulfonate, and the like. In accordance with the preferred embodiments of the invention, the surfactant component of the compositions advantageously comprises a mixture which includes at least one alkali metal or alkanolamine salt of an alkyl benzene sulfonic acid and at least one alkali metal, sodium, in particular, salt of an alkyl diphenyl ether disulfonate.

The proportions of surfactant utilized in the compositions can range from about 7% to about 30%, usually 25 from about 10% to about 20%, by weight, of the composition. In those instances where, as indicated, the surfactant employed comprises a mixture of an alkyl metal or alkanolamine salt of an alkyl benzene sulfonic acid such as triethanolamine dodecyl benzene sulfonate and an alkali metal salt of an alkyl diphenyl ether sulfonic acid such as sodium decyl diphenyl ether disulfonate, the proportion of the alkali metal or alkanolamine salt can range from about 7% to 20%, by weight, of the composition, while the proportion of the alkali metal salt of the diphenyl ether sulfonic acid can range from about 1% to 10%, by weight, of the composition.

The hydrocarbon solvents useful in the preparation of the compositions comprise petroleum derived paraffinic and cycloparaffinic hydrocarbons exemplary of which are kerosene, Nos. 1 and 2 distillate fuel oils, petroleum aliphatic solvents such as Varsol, mineral spirits, Stoddard solvent, and the like. Also useful are aromatic hydrocarbon solvents such as benzene, toluene, xylenes, and aromatic petroleum solvents examples of which are SC Solvents No. 1, No. 1-A, No. 2, and the like. The proportions of hydrocarbon solvent utilized will range from about 1% to about 20%, especially desirably from about 5% to about 15%, by weight, of the composition.

The chlorinated solvents employed in the compositions include chlorine substituted aliphatic hydrocarbons having from 1 to 6 carbon atoms which are liquid at room temperature. Exemplary of such solvents are methylene chloride, ethylene dichloride, carbon tetrachloride, 1,2-dichloroethane, 1,1,1-trichloroethane, 1,3-dichloropropane, chloroform, 1,4-dichlorobutane, perchloroethylene, trichloroethylene, and the like. Also useful are freon-type halogenated hydrocarbons such as trichloromonofluoromethane (Freon 11) and trichlorotrifluoroethane (freon 113). Other chlorinated solvents which can be used are the proprietary chlorinated solvents sold under the trademarks "CLOROETHENE" and "DOWCLENE" (Dow Chemical Company). Of the foregoing, methylene chloride is the preferred chlorinated solvent.

The proportions of chlorinated solvent used in the preparation of the compositions will range from about

1% to about 25%, usually from about 5% to about 15%, by weight, of the composition. While the proportions of hydrocarbon solvent and chlorinated solvent employed can range, as stated, from about 1% to about 20%, and from about 1% to about 25%, respectively, by weight, of the compositions, especially satisfactory results are attained with combined proportions of the two solvents ranging from about 3% to about 40%, by weight, of the compositions.

The inorganic builders used in the compositions of this invention include alkali metal silicates, borates, carbonates, nitrites, sulfates, polyphosphates, metaphosphates, orthophosphates and pyrophosphates such as sodium silicate, sodium metasilicate, sodium orthosilicate, sodium tetraborate, sodium borate, sodium sulfate, sodium carbonate, trisodium phosphate, disodium orthophosphate, sodium metaphosphate, sodium nitrite, sodium pyrophosphate, potassium pyrophosphate, and the like. The proportions of inorganic builders incorporated into the compositions will range from about 0.5% to about 6%, usually from about 2% to about 4%, by weight, of the composition. The inorganic builders among other things, act to enhance the soil removal and suspension properties of the compositions.

As stated above, various supplemental ingredients, optional but desirable, can be added to the foamable compositions of this invention. These comprise, for example, germicides, sequestering agents for greater hard water tolerance, coloring dyes, perfumes, and the like, all of which when utilized, are employed in small amounts, most of them below 1%, by weight, of the composition.

The following examples are illustrative of particularly preferred embodiments of the invention. It should be understood that variations may be made therein in a number of particulars without in any way departing from the fundamental principles and teachings provided herein. The examples, therefore, are not to be construed in any way as limitative of the scope of the invention.

EXAMPLE I

Ingredient	Weight Percent
Water	54

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Hexylene glycol	2
Monobutyl ether of ethylene glycol	8
Sodium decyl diphenyl ether disulfonate	3
Triethanolamine dodecyl benzene sulfonate	13
Sodium silicate	4
Kerosene (deodorized)	12
Methylene chloride	4

EXAMPLE II

Water	55
Hexylene glycol	5
Monooethyl ether of ethylene glycol	5
Sodium dodecyl diphenyl ether disulfonate	4
Sodium dodecyl benzene sulfonate	16
Sodium sulfate	3
SC solvent No. 1	7
1,2-dichloroethane	5

EXAMPLE III

Water	70
Heptylene glycol	3
Monobutyl ether of ethylene glycol	5

EXAMPLE III-Continued

Sodium dodecyl diphenyl ether disulfonate	4
Triethanolamine dodecyl benzene sulfonate	10
Sodium pyrophosphate	2
Benzene	3
Perchloroethylene	3

What is claimed is:

1. A stable, clear, non-flammable, water and organic solvent based foamable cleaning composition, consisting essentially of, in approximately the stated percentages by weight:

Water	40 to 80
Hexylene glycol	2 to 15
Monobutyl ether of ethylene glycol	1 to 15
Sodium decyl diphenyl ether disulfonate	1 to 10
Triethanolamine dodecyl benzene sulfonate	7 to 20
Sodium silicate	0.5 to 6
Kerosene	1 to 20
Methylene chloride	1 to 25

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