

Nov. 21, 1950

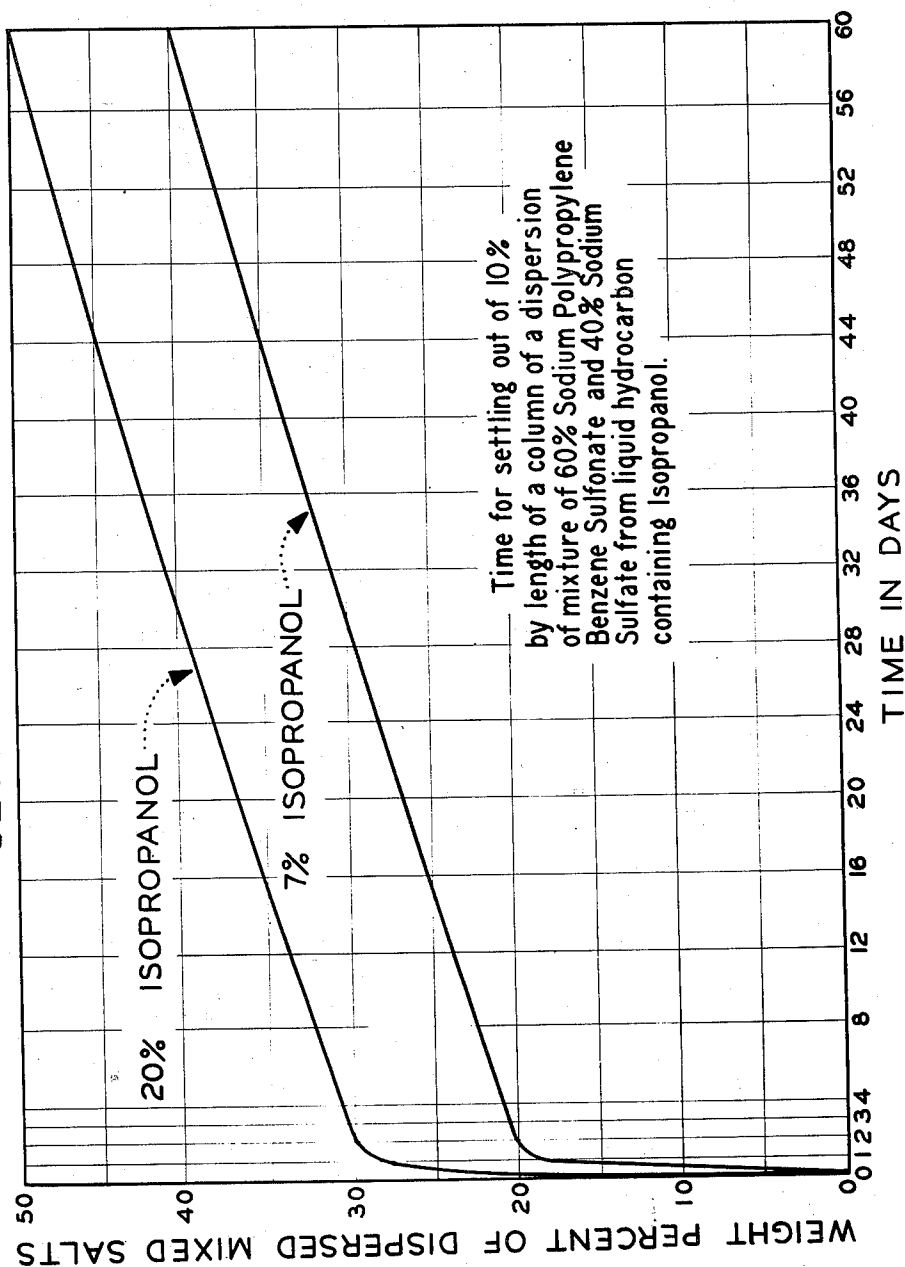
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2,531,166

DETERGENT CONCENTRATE

Filed Nov. 8, 1947

FIGURE I
SETTLING OUT TIMES



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2,531,166

DETERGENT CONCENTRATE

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Application November 8, 1947, Serial No. 784,883

5 Claims. (Cl. 252-161)

1

This invention relates to synthetic detergents and more particularly to dispersions of alkali salts of alkyl aryl sulfonates admixed with alkali sulfates in liquid hydrocarbons.

Detergent alkali alkyl aryl sulfonates possessing long chain alkyl groups and admixed with detergent builders are commonly used in aqueous solution. However, such solutions are generally not effective for cleaning heavily soiled and greasy surfaces such as the back of rear engine Diesel powered busses, heavily soiled fabrics and the like.

It is an object of this invention to prepare a detergent composition effective on heavily soiled surfaces.

It is also an object of this invention to disperse alkali salts of long chain alkyl aryl sulfonates admixed with alkali inorganic salt builders in liquid hydrocarbons to form substantially stable dispersions of high concentration.

It is also an object of this invention to prepare a detergent dispersoid concentrate in liquid hydrocarbon adapted for removing heavy greasy soils with or without aqueous dilution.

Other objects of this invention will become apparent from the disclosure proper.

The single figure is a graph showing settling out times of dispersed sodium sulfate from non-aqueous isopropanol-liquid hydrocarbons solutions of alkyl aryl sulfonates having long chain alkyl groups.

I have attained these desirable ends of uniformly concentrated dispersoid mixtures of alkali alkyl aryl sulfonates having long chain alkyl groups and alkali inorganic salt builders in liquid hydrocarbons by means of oil soluble organic oxygen containing solubilizer, with or without mahogany soap. In the preferred form of my invention as exemplified by the presence of mahogany soap and isopropanol, I have been able to increase the dispersive power of liquid hydrocarbon for alkali alkyl aryl sulfonate having long chain alkyl groups admixed with alkali inorganic salt builders so as to yield a dispersion which exhibits only negligible settling out after 30 days standing.

While various detergent alkali alkyl aryl sulfonates are operable, I prefer to use those possessing a benzene nucleus and having a long chain alkyl group attached thereto, said alkyl group having preferably 10 to 16 carbon atoms. These preferred long chain alkali alkyl benzene sulfonates are prepared by alkylating benzene with polypropylene, thereby yielding a polypropylene substituted benzene compound, which, on mono-

2

sulfonation with fuming sulfuric acid followed by subsequent neutralization, yields the said preferred product.

As alkali inorganic salt builders, I may use alkali sulfates, alkali phosphates, more particularly alkali pyrophosphates, and like compounds. In my preferred compositions, I use alkali sulfates and more specifically, sodium sulfate which I have found to be a very beneficial builder.

The liquid hydrocarbons I prefer to use are aromatic and sulfonatable. The preferred aromatic hydrocarbons are substantially 100% sulfonatable, and generally boil between 275° F. and 345° F. Furthermore, they have a mixed aniline point of below about 63° F. by ASTM Method D-611. However, other liquid aromatic hydrocarbons, such as those boiling between 200° F. and 400° F. are suitable for my compositions. In lieu of liquid aromatic hydrocarbons, I may use liquid paraffinic hydrocarbons or mixtures of liquid aromatic hydrocarbons and liquid paraffinic hydrocarbons provided such liquid paraffinic hydrocarbons or aromatic mixtures thereof boil between 200° F. and 400° F. For example, a solvent composed of about 50% paraffins, 44% naphthenes and 6% aromatics having a boiling range within 200° F. to 400° F. gave satisfactory results when substituted in lieu of the 100% sulfonatable aromatic hydrocarbons above.

For my oil-soluble organic oxygen containing solubilizer I may use any water soluble or partly water soluble alcohol, ketone, ether-alcohol or aliphatic ester which is soluble in liquid hydrocarbon at least to the extent of about 5%, for example, isopropanol, methyl ethyl ketone, monomethyl ether of ethylene glycol, monoethyl ether of diethylene glycol and the like. These compounds prevent gelling of my dispersions, particularly at the higher concentrations. While many kinds of oxygen compounds satisfying the above condition are operable, I prefer isopropanol in my compositions.

The mahogany soaps I may use are obtained from petroleum white oil manufacturing processes. They are obtained by treating petroleum stocks with fuming sulfuric acid. A treatment with alcoholic solution removes the oil-soluble sulfonic acids which are neutralized with alkali to give the desired alkali oil-soluble petroleum sulfonate salts. Said sulfonate salts in this purified form have a molecular weight of about 400 to 420 and are commonly known as mahogany soap.

In compounding my inventive compositions, I prefer to add my sodium sulfate or other alkali

inorganic salt builder simultaneously with the alkali alkyl aryl sulfonate and admixed therewith. Furthermore, I prefer ratios of alkali sulfate to alkali alkyl aryl sulfonate of 2 parts of the former to 3 parts of the latter. However, other ratios and independent addition of the builder is within the scope of my invention.

Turning now to Tables I and II, the "10 per cent settling out times" of dispersed mixed salts comprising 60 per cent sodium polypropylene benzene sulfonate and 40 per cent sodium sulfate from aromatic hydrocarbon dispersions containing varying amounts of isopropanol are given. By "10 per cent settling out time" I mean the time for a column of dispersion to settle so as to yield 10 per cent by length of clear supernatant liquid. These results are graphically given in the figure.

TABLE I

Time in days for 10 per cent settling out of dispersed solid phase comprising 60 per cent sodium polypropylene benzene sulfonate containing 10 to 16 carbon atoms in the alkyl group and 40 per cent sodium sulfate dispersed in a liquid aromatic hydrocarbon mixture, containing 7 per cent isopropanol

Mixed Sodium Polypropylene Benzene Sulfonate-Sulfate (Ratio 3:2); Per Cent Dispersion by Weight	Time in Days for 10% Settling
5	<1
10	<1
15	<1
20	2
25	16
30	30
35	45
40	60

< = less than

TABLE II

Time in days for 10 per cent settling out of dispersed solid phase comprising 60 per cent sodium polypropylene benzene sulfonate containing 10 to 16 carbon atoms in the alkyl group and 40 per cent sodium sulfate dispersed in a liquid aromatic hydrocarbon mixture, containing 20 per cent isopropanol

Mixed Sodium Polypropylene Benzene Sulfonate-Sulfate (Ratio 3:2); Per Cent Dispersion by Weight	Time in Days for 10% Settling
5	<1
10	<1
15	<1
20	<1
25	<1
30	2
35	16
40	30
45	45
50	60

< = less than

The compositions of Tables I and II containing no mahogany soap are stable only at the higher concentrations. Detergent sodium polypropylene benzene-sodium sulfate concentrations (ratio 3:2, respectively) below 25% for 7 per cent isopropanol solutions, and below 35% for 20 per cent isopropanol solutions are considered ineffi-

cient because of their relatively fast settling out times. I have also found that the dispersions shown in Tables I and II may be substantially improved by the additions of small amounts of about 4 per cent mahogany soaps. Improvements over the mahogany soap free composition in the order of 10 to 20 per cent in "10 per cent settling out time" are common by said additions of mahogany soap. For these reasons, I prefer to use mahogany soaps in my compositions.

As an example of my preferred composition containing mahogany soap, the following composition is given:

	Percent by weight
Sodium polypropylene benzene sulfonate 60% and sodium sulfate 40%-----	28.0
Mahogany soap-----	4.0
Isopropanol-----	4.0
Liquid aromatic hydrocarbon (mixed aniline point 63, boiling range 275° F. to 345° F.)--	64.0

In compounding my compositions, I prefer to mix the liquid hydrocarbon, isopropanol and mahogany soap (if any) together to yield a uniform product. The dry sodium polypropylene benzene sulfonate: sodium sulfate mixture, preferably containing about 40 per cent sodium sulfate, is then added with constant agitation until the dispersion is complete. A process conducted in this sequence is preferred for best results. The resulting product may be passed through a colloid mill or alternatively through a homogenizer for more uniform mixing and dispersion of the solid phase. This procedure is applicable to the preparation of all my detergent compositions.

My preferred composition is a stably dispersed product which, on standing for about two weeks, shows substantially no clear supernatant liquid and which, on standing for periods of thirty days or more, shows but a negligible separation of the solid phase. This negligible settling out is readily redispersed on gentle shaking to give the desired homogeneous product.

While I do not fully understand why such unexpected and unpredictable stability with isopropanol and equivalent solubilizers in hydrocarbon liquids of the nature indicated occurs and consequently do not wish to be bound by any theory, nevertheless I believe that there exist desirable ratios of the amount of colloiddally dispersed solid phase alkali alkyl aryl sulfonate to the amount of dissolved alkali alkyl aryl sulfonate, and there appear to be optimum concentrations of mixed alkali alkyl aryl sulfonate-alkali sulfate salt, which, if exceeded, lead to conditions favoring substantially permanent dispersions of solid phase colloidal particles. It is believed that the colloiddally dispersed solid phase alkali alkyl aryl sulfonate particles adsorb the colloiddally dispersed alkali sulfate particles, thereby yielding a stable dispersion. In general, I have found that isopropanol and equivalent compounds act as solubilizers of alkali alkyl aryl sulfonate, whereas the mahogany soap and the colloiddally dispersed alkali alkyl aryl sulfonates act as dispersants of the alkali inorganic salt builders, for example, sodium sulfate.

The detergent concentrates of my invention, on dilution with water in amounts up to 100 parts or more by weight of water, yield uniform emulsions of the oil-in-water type which are very effective in cleaning heavily soiled, greasy or oily articles and surfaces in this diluted aqueous form. However, the use of the concentrate per se is advantageous for particularly greasy surfaces.

5

While I have presented my invention by way of a few illustrations, obvious variants are apparent to those skilled in the art. Therefore, the broad aspects of the invention as claimed are believed to define the true bounds of my contribution to the art.

I claim:

1. A concentrated stable dispersoid of an alkyl aryl sulfonate detergent in a liquid hydrocarbon, said dispersoid comprising said liquid hydrocarbon having dispersed therein from a minimum of 25-35% by weight to a maximum of 40-50% by weight, based on said dispersoid, of a detergent consisting of a long chain alkyl aryl sulfonate detergent consisting predominantly of alkyl aryl sulfonates containing from 10 to 16 carbon atoms in a single alkyl side chain and an inorganic salt builder therefor selected from the group consisting of alkali sulfates, alkali phosphates and alkali pyrophosphates, and from about 4 to about 20% by weight, based on said dispersoid, of an organic solubilizer from the group consisting of water soluble aliphatic alcohols, ketones, and ether alcohols, soluble in said liquid hydrocarbon to the extent of at least about 5%.

2. A concentrated stable dispersoid as defined in claim 1, wherein said dispersoid contains about 4% by weight of mahogany soap, based on said dispersoid.

3. A concentrated stable dispersoid as defined in claim 1, wherein the alkali alkyl aryl sulfonate component of the detergent is an alkali alkyl benzene sulfonate containing from 10 to 16 carbon atoms in the alkyl chain.

4. A concentrated stable dispersoid as defined

6

in claim 1, wherein said liquid hydrocarbon is an aromatic hydrocarbon, said alkali alkyl aryl sulfonate is sodium polypropylene benzene sulfonate containing from 10 to 16 carbon atoms in the polypropylene radical, said inorganic salt builder is sodium sulfate, and said organic solubilizer is isopropanol.

5. A concentrated stable dispersoid of an alkyl aryl sulfonate detergent in a liquid aromatic hydrocarbon, said dispersoid consisting essentially of said liquid aromatic hydrocarbon having dispersed therein about 28% by weight, based on said dispersoid, of a detergent consisting of sodium polypropylene benzene sulfonate containing from 10 to 16 carbon atoms in the polypropylene radical and sodium sulfate as a builder therefor in a ratio of about 2 parts of sulfate to about 3 parts of sulfonate, said dispersoid further containing about 4% by weight of isopropanol and about 4% by weight of mahogany soap based on said dispersoid.

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