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3,686,099

DETERGENT

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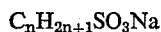
Int. Cl. C11d 1/12

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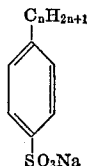
1 Claim

ABSTRACT OF THE DISCLOSURE

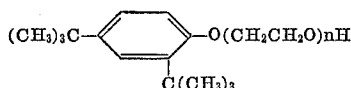
Method for cleaning cargo tanks of sea tankers from the remains of oil products, fats and the like consisting essentially of 65-75 wt. percent of an alkylsulfonate having the general formula



wherein $n=12-18$, 20-30 wt. percent of an alkylbenzenesulfonate having the general formula



wherein $n=10-14$, and 3-7, wt. percent of a polyethylene glycol ether of di-tert-butylphenol having the general formula



wherein $n=6-7$. The detergent is preferably used as a 0.05-0.2% solution in sea water at a temperature of 60-80° C.

This is a continuation-in-part application of Ser. No. 462,445, filed June 8, 1965 now abandoned.

This invention relates to a detergent composition intended for cleaning tankers from the remains of petroleum products or fats.

Known in the art are diverse detergent compositions, each consisting of a mixture of various active components.

Prosch (German Pat. No. 1,166,960) contemplates the employment of solutions comprised of ethylene oxidenonylphenol condensate and alkylsulfonates containing from 25 to 40%, (preferably from 30 to 35%) of active component, provision being made for incorporating into the formulation an alkylarylsulfonate having 12 carbon atoms in the alkyl group.

Similar to the majority of inventions in this field, the Prosch patent claims an all-purpose detergent formulation noted primarily for its high detergency, emulsification and also for copious foaming.

The aforementioned detergent compositions are unsuitable for the mechanized chemical cleaning of tankers wherein closed-cycle cleaning operations involve repeated and continuous use of a detergent solution batch, and the specific requirements of the process necessitate strict observance of a pre-set stability of highly concentrated

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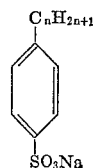
petroleum-in-detergent solution emulsions and stipulates that, upon emulsion breakdown, the recovered petroleum product be sparingly watered and the detergent solution noted for its suppressed resorptive properties be suitable for subsequent use.

It is further pertinent that the foaming power of the detergent composition be at a minimum in order to obtain the estimated performance of emulsion pumps and also to obviate the secondary contamination of the reservoirs being cleaned as a result of petroleum-containing foam breakdown.

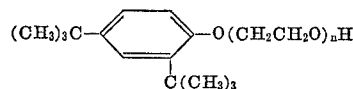
It is an object of the present invention to provide a detergent composition that meets the specific requirements imposed by the mechanized chemical cleaning of tankers from the remains of petroleum products and fat and makes use of sea water as solvent.

This object is accomplished, according to the invention, by appropriate selection and rigorous proportioning of surfactants which are synergists with respect to detergency and antagonists with respect to foaming and stabilizing effect when used in sea water.

The present detergent composition comprises 65-75 wt. percent of an alkylsulfonate having the general formula $C_nH_{2n+1}SO_3Na$, wherein $n=12-18$; 20-30 wt. percent of an alkylbenzenesulfonate having the general formula



wherein $n=10-14$ and 3-7 wt. percent of a polyethylene glycol ether of di-tert-butylphenol having the general formula



wherein $n=6-7$ and finds application in the form of a solution in sea water.

To obtain superior results in tanker cleaning operations, the detergent composition should preferably contain the following proportions of the components, wt. percent:

Alkylsulfonate	approx. 70
Alkylbenzenesulfonate	approx. 25
Polyethylene glycol ether of di-tert butylphenol	approx. 5

The detergent solution is prepared by dissolving 0.05-0.2 wt. percent of the present detergent composition in sea water heated to a temperature of 60-80° C.

The present invention makes it possible to obtain a detergent composition which is noted for its high detergency and simultaneously exhibits a complex of characteristics that fully meet the specific requirements involved in cleaning tankers from the remains of petroleum products or fat.

When used in conjunction with mechanized systems of tanker cleaning from the remains of petroleum products or whale oil, the present detergent composition displays outstanding technical and economic efficiency.

The process of tanker cleaning involves the formation of a highly concentrated petroleum product or whale oil-in-detergent solution emulsion which undergoes spontaneous, fairly rapid breakdown to yield a dewatered petroleum product or whale oil and the clarified detergent solution separated by a sharp interface. The clarified detergent solution is repeatedly used in the closed-cycle system for subsequent cleaning operations, whereby the dis-

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charge of the solution in question into the sea or rivers is avoided and the pollution of water basins is avoided.

As a result of subsequent cleaning all or some tanks of the tanker, the thus removed petroleum product or whale oil collects in a settling tank and may be recovered for subsequent utilization.

Cleaning a tanker of 10,000-ton cargo capacity results in collecting 80–100 tons of petroleum products or 25–30 tons of whale oil which are usually lost with the detergent solution discarded into the sea.

Efficient spontaneous breakdown of the emulsion to form a petroleum product layer and a clarified detergent solution layer is conducive to performing tanker cleaning operations by the closed-cycle, single stage technique, so that one tank only is employed for both detergent solution preparation and recovered product collection. An added advantage is that cleaning operations entail no additional expenses for reconstruction of available equipment.

When recourse is had to the present detergent composition, the content of water in bottom settlings of the recovered petroleum product is reduced from 60–80% down to 0.5–6%.

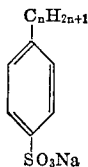
The present detergent composition renders it possible to carry out tanker cleaning operations even during ballast passages in the areas where sea pollution with petroleum products is prohibited by the International Convention on Sea Pollution, inclusive. It can likewise be used for preparing tankers for taking in another cargo, e.g., bulk raw sugar or grain, without resorting to additional tank cleaning. After cleaning the tanker with the present detergent composition, it is feasible to carry out repairs involving the use of open flame.

To effect the complete cleaning of a tanker having a cargo capacity of 10,000 tons, the consumption of the present detergent composition should be 200 to 400 kg.

The present detergent composition is noted for its storage stability and requires no special packaging.

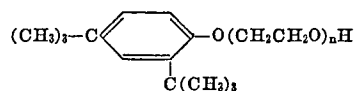
EXAMPLE

Seventy grams of an alkylsulfonate having from 12 to 18 carbon atoms in the alkyl radical and containing about 85% of the active component represented by the general formula $C_nH_{2n+1}SO_3Na$, wherein $n=12-18$, is mixed with 25 grams of an alkylbenzenesulfonate having from 10 to 14 carbon atoms in the alkyl radical and represented by the general formula



wherein $n=10-14$, and 5 grams of a polyethylene glycol ether of di-tert-butylphenol containing from 6 to 7 ethylene oxide groups and having the general formula

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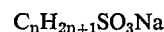


wherein $n=6-7$.

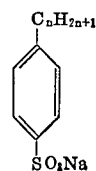
Mixing yields 100 grams of a paste which is then dissolved in sea water heated to a temperature of 60–80° C. to obtain a 0.05% solution. The thus prepared solution is ready for use.

What we claim is:

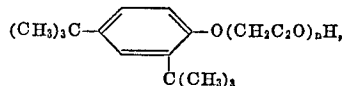
1. A method of cleaning petroleum residues from tankers comprising the steps of treating said residues using a detergent composition consisting essentially of about 70 wt. percent of an alkylsulfonate having the general formula



wherein $n=12-18$, about 25 wt. percent of an alkylbenzenesulfonate having the general formula



wherein $n=10-14$, and about 5 wt. percent of a polyethylene glycol ether of di-tert-butylphenol having the general formula



wherein $n=6-7$ as a 0.05–0.2% solution in sea water, thereby forming a quick-breaking emulsion, separating the detergent solution from the emulsion, and using same for subsequent cleaning operations.

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U.S. Cl. X.R.

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