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OILED DUST CLOTH COMPOSITION

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The present invention relates to treated dusting and polishing cloths and improved oil compositions used in the treatment of such cloths.

Oil-treated or impregnated fabrics are extensively employed in wiping furniture, floors, walls and other solid surfaces to remove dust and other superficial deposits therefrom. While a dry untreated cloth will remove particles of dust or other loose surface deposits to greater or less degree by mechanical wiping action, such treatment merely tends to scatter these fine particles to the atmosphere in which these become temporarily suspended only to be redeposited in a short while on the same or on an adjacent surface. On the other hand, a cloth which has been indiscriminately imbibed in oil may in fresh state pick up fine particles of dust by adsorption; such oiled cloth however tends to leave on the wiped surface an oily dust-catching film, smears the surface, and in a relatively short time, moreover, the wiping cloth becomes so laden with adsorbed dirt that the adsorbed particles are released to the next surface wiped thereby.

Among the objects of the present invention is to provide a treated wiping cloth or mop fabric which has the appearance of a dry cloth and is substantially free of oily feel, which cloth can be applied in wiping of surfaces without leaving an oily dust-catching film thereon. Another object of the invention is to provide a treated wiping cloth capable of picking up dust particles and retaining the same in the cloth by static attraction and adherence.

A further object of the invention is to provide a treated germicidal wiping cloth capable of killing or removing many forms of micro-organisms commonly present on contaminated surfaces so as to render such sanitized surfaces relatively sterile and repellant to further propagation of micro-organisms lodged thereon.

A further object of the invention is to provide an oil composition for use in treatment of wiping cloths and stranded mop fabrics, which composition is capable of conferring the above-recited properties to the fabric treated therewith, said oil composition being readily emulsified in water and capable of self-exhaustion from aqueous emulsion to be plated selectively on the cloth or other fabric dipped in such emulsion.

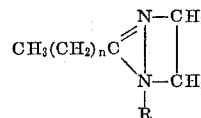
Other objects and beneficial advantages of the novel oil composition and of cloths treated therewith will be apparent from the detailed description which follows:

In accordance with the present invention the oil composition utilized for treating the wiping cloth comprises essentially: (1) an active emulsifying agent composed of a cationically-active imidazoline compound admixed with a nonionic surface active agent in controlled proportions; (2) a compatible germicidal agent; incorporated in (3) a large body of mineral oil. This oil composition, when formulated as hereinafter described, is readily emulsified in water by simple stirring. When a cellulosic fabric is dipped into the aqueous emulsion, the oil is exhausted or plated on the fabric without further addition of emulsion-breaking or discharging agents. To the described oil composition there may be added, if desired, a small amount of oil soluble dye or coloring matter. In the

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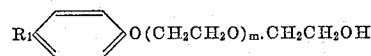
preferred embodiment there is added to the oil composition a compatible flame retardant composition which is taken up in the oil phase of the emulsion and is plated out from the emulsion onto the fabric with the oil.

The imidazoline compound serves not only as an emulsifying assistant but has the added function of conferring substantivity to the oil composition so that it is picked up and retained by cellulosic fibers. The cellulosic fabric treated with the oil composition containing the cation-active imidazoline compound acquires the property of attracting dust and other fine particles on contact therewith apparently due to opposed static electric charge of the cloth and such particles. This capacity to attract and retain particles of opposite charge is many times greater than that which could be retained by sorption in an inactive oil film impregnating the cloth. While for different types of oils or different formulations and proportions other kinds of cationic surfactant compounds might be operative, for the specific compositions herein described, it has been empirically found in testing numerous compositions that only certain types of cationic surfactants are capable of forming a self-exhausting emulsion. Specifically the cationically-active compound employed is a normally liquid imidazoline corresponding to the formula

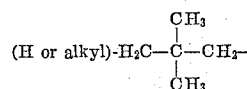


wherein R is a low molecular weight alkyl or hydroxy alkyl group having an alkyl carbon attached to nitrogen, said alkyl group having up to 6 carbon atoms; and n is 9 to 18. These imidazolines in the form of free tertiary base are soluble in hydrocarbon oils and in organic solvents but are relatively insoluble in water; they can be dispersed in water with the aid of polar solvents. With the aid of special non-ionic surfactants in certain proportions these imidazolines are capable of emulsifying hydrocarbon oils to form oil in water emulsions. From the oil water interface these cationic imidazolines are strongly adsorbed on negatively charged surfaces such as cellulosic textiles.

The described imidazoline base is admixed with about one-half to three-fourths part by weight of an active non-ionic emulsifying agent in the form of an alkaryl polyethoxyethanol containing at least one neopentyl group. The non-ionic compound should be one soluble in hydrocarbon oils of the type employed in the emulsion. These non-ionic emulsifying agents correspond to the formula



wherein R₁ is an alkyl group of 5 to 10 carbon atoms said alkyl group containing at least one neopentyl structure, i.e.:



and m is 1 to 5.

The germicidal agent which has been found to give best over-all results in the described oil composition is ortho phenyl phenol. Other germicides, including the closely related sodium o-phenyl phenolate as well as those having higher phenol coefficient such as certain of the halogenated phenols, have not been found to work as well

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as the o-phenyl phenol, either because of poorer dispersion in the oil phase, insufficient exhaustion onto the cloth, or loss of activity in the presence of other components of the cloth-treating composition.

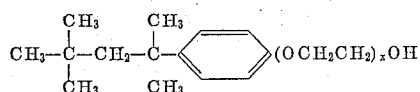
In the preparation of the self-exhausting oil composition for treating of cloths, the mixed emulsifier (composed of imidazoline compounds and non-ionic alkyl phenoxy polyethoxyethanol) is agitated thoroughly with the naphthenic mineral oil in an amount of 2.0 to 3% by volume of the mineral oil, to form a stable and homogenous mixture. While no fully satisfactory explanation therefor can be offered at present, mineral oils derived from paraffinic crude oils (Pennsylvania) do not operate satisfactorily. Good results have been obtained with naphthenic mineral oils of 22.5 to 24.5 API gravity and having a Saybolt viscosity (at 100° F.) of 100 to 305 seconds. This range includes the typical non-volatile automotive lube oils and somewhat lower boiling range oils going into the heavy fuel oil range.

The self-exhausting oil composition including the combined emulsifier components described, is readily emulsified in water by simple agitation. For most effective results it is recommended that the oil composition be employed in the ratio of about 2 to 3 gallons of oil (including emulsifiers) per 100 pounds of cellulosic fabric. This amount of emulsifiable oil composition is emulsified by agitation in 100 to 200 gallons of water. Treatment of the cloth is carried out, for example, in a conventional wash wheel, at a water temperature of about 90 to 110° F. operating the wheel until the water clears. The oil is plated out of the water in about 10 to 15 minutes; the higher the temperature the shorter the time required for exhaustion of the oil composition out of the emulsion onto the cloth.

The wiping cloth treated in accordance with the invention, leaves a satisfactory sterilized surface on wiping, when the cloth contains a minimum of 0.004% o-phenyl phenol by weight of the dry cloth. Since the cloth picks up 16% to 20% by weight of oil when using the proportions of oil to fabric designated above, the emulsified oil should contain a minimum of about 0.025–0.30% by weight of o-phenyl phenol.

Example

(a) The emulsifier was prepared by stirring 15 volumes of 1-hydroxyethyl-2-heptadecyl imidazoline together with 10 volumes of a mixture of homologues of:



($x=2$ to 5), and 5 volumes of naphthenic mineral oil (API gravity=22.7), forming a concentrate. To the concentrate was added 0.8% by weight of o-phenyl phenol and thoroughly admixed therein.

(b) The concentrate thus obtained was diluted by agitation with 35.7 volumes of the same type of naphthenic mineral oil to produce a germicidal self-exhausting oil containing per 100 pounds of naphthenic oil, about 1.5 pounds imidazoline and 1 pound non-ionic alkyl phenoxy compound.

In some instances, particularly where long distance transport is involved, it is preferred to ship the concentrate and have the dilution with additional mineral oil effected at the destination.

In a typical operation as applied to washed cloths of cellulosic fabric, the self-exhausting oil is added to a conventional laundry wash wheel containing 100 to 200 gallons of water, using about 2.5 gallons of the dilute emulsifiable oil composition (b) per 100 pounds of cloth. Running at 90 to 110° F., the oil is almost completely plated out of the cloth in about 10 to 15 minutes. Excess water is removed from the fabric by pressing or centrifuging followed by conventional drying, leaving the oil intact and uniformly distributed therein.

Typical marketed mineral oils having the following description are illustrative of naphthenic oils which have been successfully employed in accordance with the invention:

	Sample A	Sample B
Gravity, API°	22.7	24.5
Viscosity (S.U.S.):		
At 100° F.	305	106
At 10° F.	47.2	38.3
Flash, O.C., ° F.	355	320
Fire, O.C., ° F.	400	355
Pour, ° F.	-30	-60
Color, ASTM D155	2.5	2.0
Carbon Residue, percent	0.07	0.02

When the cloth or fabric has been soiled in use, it is readily laundered, the oil being removed together with the dirt. The textile material can then be retreated with fresh self-exhausting oil in the same wash wheel, if desired, in the last stages of water rinsing or following such rinsing. While treatment in the wash wheel is preferred for simplicity and convenience, other methods of applying the oil may be utilized, such as roller padding. As applied to wipers made of paper, felted goods, or other disposable cellulosic materials of low wet strength, which are not intended to be laundered after use, impregnation can be effected by padding, spraying or dipping.

Wiping material treated with the oil composition described can be used on wood, tile, metal or plastic floors, shelving, counters, desks and all dust-collecting surfaces that are wiped normally by cloth or mop. Wiping of a contaminated surface with the treated germicidal cloth effectively eliminates bacteria rapidly and almost completely, as will be seen from the following test.

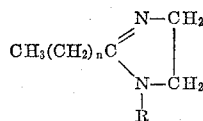
A culture smear was taken of a marked area of a floor by use of a sterile swab, which smear was transferred to a sterile agar plate and the culture incubated at 32–35° C. for 48 hours. The same floor area was then wiped in customary manner with a cloth impregnated with the described germicidal oil, and culture smears taken at 5 minutes, 3 hours, 8 hours and 24 hours after wiping. The treated area was protected from traffic during the test period. The incubated smear of the floor area prior to wiping developed "solid" growth of bacteria on the agar plate. The subsequent cultures taken of the wiped area showed that after 5 minutes the area was almost sterile and the cultures were completely negative at 3 hours and 8 hours after wiping. The smear made at 24 hours after wiping developed a single bacterial colony on the agar plate.

Comparative tests were made by wiping asphalt tile adjacent high traffic floor areas respectively with a dust mop in regular use and with a mop impregnated with germicidal oil composition of the invention. The latter showed a continuing marked reduction in bacterial density (40 to 60% reduction) based on smears made of the adjoining areas at periodic intervals after wiping.

Obviously many modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof and therefore only such limitations should be imposed as are indicated in the appended claims.

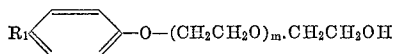
What is claimed is:

1. A self-emulsifying, self-exhausting germicidal oil composition for treatment of cellulosic wiping fabrics comprising a non-volatile naphthenic mineral oil in admixture with a minor quantity of emulsifier and ortho phenyl phenol, said emulsifier being essentially composed of a mixture of a normally liquid imidazoline compound and a non-ionic surfactant; said imidazoline compound being of the formula



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wherein R is a member of the group consisting of alkyl and hydroxy alkyl of up to 6 carbon atoms and n is 9 to 18; and said non-ionic surfactant being of the formula



wherein R_1 is an alkyl group of up to 10 carbon atoms containing at least one neopentyl structure and m is 2 to 5; said emulsifier being present in an amount of 2 to 3% by volume of said naphthenic oil, and the o-phenyl phenol constituting at least 0.025% by weight of the germicidal oil composition.

2. The method of preparing treated cellulosic materials for use in wiping and dusting which method comprises admixing a germicidal oil corresponding to the composition defined in claim 1, with a large body of water under agitation to form an emulsion, and contacting said cellulosic material with said emulsion at moderate temperature until the water becomes substantially clear.

3. An impregnated dusting cloth prepared by the method defined in claim 2.

4. A germicidal wiping cloth comprising cellulosic material having incorporated therein 16 to 20% by weight of an oil composition comprising a naphthenic mineral oil homogenously associated with a mixture comprising a cation active normally liquid C-alkyl N-alkanol imidazoline; non-ionic isooctyl phenoxy polyethoxyethanol, and o-phenyl phenol; said imidazoline being present in

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about 1.5 times the quantity by weight to the said non-ionic compound.

5. A germicidal oil concentrate prepared for dilution with mineral oil to provide a self-exhausting, self-emulsifying oil composition for treatment of wiping cloths, said concentrate comprising: (1) an emulsifier composed of N-hydroxyethyl-2-heptadecyl imidazoline and a non-ionic alkyl phenoxy polyethoxyethanol wherein said alkyl group contains at least one neopentyl structure, (2) naphthenic mineral oil, and (3) o-phenyl phenol.

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