United States Patent Office

3,329,637

Patented July 4, 1967

3,329,637

WASHING AND PROTECTIVE FILM-FORMING COMPOSITION

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No Drawing. Filed Mar. 9, 1966, Ser. No. 532,882

7 Claims. (Cl. 260—29.4)

ABSTRACT OF THE DISCLOSURE

One-step washing and polishing composition typically comprising a mixture of 0.25–30 parts by weight of an anionic detergent, 0.25–30 parts by weight of a melamine-formaldehyde resin condensed with iminobispropylamine, and 1–90 parts by weight of an aqueous emulsion of a film-forming vinyl resin.

This application is a continuation-in-part of application Ser. Nos. 779,836, filed Dec. 12, 1958, now abandoned, and 423,323, filed Jan. 4, 1965, now abandoned.

The present invention relates to a washing and polishing composition or formulation adaptable for use on various surfaces, such as linoleum, rubber, vinyl or asphalt tile, wood floors, automobile bodies, and the like.

More particularly, the present invention relates to a washing composition which leaves a durable, protective, and lustrous coating on a surface to be cleaned and polished at the time of cleaning and to a method of rendering a latex composition compatible with a polymeric cationic material.

Heretofore, in order to obtain a durable, lustrous, protective coating on a given surface, as for example, automobile bodies, the body was preferably cleaned, as by washing with water or with a specially prepared cleaning formulation, and thereafter a protective lustrous coating, usually employing a hard wax as the base material, was applied and buffed to obtain the desired coating.

Subsequently, "one-shot" or one-application cleaning and polishing compositions containing waxes and abrasives were developed, but in essence these compositions functioned or performed satisfactorily only when the surface, as for example, an automobile body, had been previously cleaned, as by washing. In theory, they would function on automobile bodies characterized as being only slightly dirty or grimy, because such formulations contained polishing agents, such as waxes with silicones, which required less buffing to obtain a lustrous finish. In such formulations, mild abrasives usually provide the cleaning action.

The most pronounced difficulty or shortcoming of these "one-shot" applications is their reduced durability to weathering and the fact that they require buffing. Thus, in order to keep a good protective coating, as for example, on an automobile body, many more applications of this sort are required as compared with those achieved in a standard two step procedure comprising a thorough cleaning followed by application of a hard lustrous wax finish.

Moreover, wax, the major protective ingredient in the foregoing procedures, requires buffing to achieve a lustrous appearance and has a relatively limited protective life, particularly under outdoor conditions.

In summary, the more durable lustrous finishes are characterized by the presence of a polishing wax, and to be effective must be applied in two steps, namely, a cleaning and polishing procedure. While one-application cleaning and polishing formulations have been used, they are less durable and in actuality are limited in application to surfaces which are only slightly grimy. The latter are cleaning and polishing formulations, as opposed to washing and polishing formulations, and require buffing subsequent to application.

Accordingly, it is an object of the present invention to provide a washing and protective film-forming composition which cleans by washing and which simultaneously deposits a long-lasting self-polishing coating on the surface to be cleaned.

It is a further object of the present invention to provide a washing and polishing formulation which simultaneously with washing applies a protective lustrous coating on the surface to be cleaned, which coating does not require subsequent buffing and which substantially outlasts wax-containing coatings.

It is a still further object of the present invention to provide such a composition or formulation which is particularly applicable to such surfaces as linoleum, the various forms of tiles employed as floor covering, wooden floors, enameled and lacquered bodies, such as for example, those found on automobiles, refrigerators, stoves and the like.

It is a still further object of the present invention to provide such a composition which is useful for applying long-lasting lustrous protective coatings to metals and other surfaces, while washing the same, and which, in general, may be characterized by great versatility in the field of application of protective coatings, such as water proofing, rust resistant finishes, and other types of films and coatings.

These and other objects and advantages of the present invention will appear more clearly from the following description thereof.

In accordance with the present invention, a washing formulation is provided which in one application is capable of cleaning a surface and leaving a durable, lustrous, residual film. The formulation comprises a mixture of (1) a non-soap detergent, (2) a polymeric cationic exhausting agent and (3) an aqueous emulsion of a substantially water-insluble film-forming thermoplastic resin.

A particularly important aspect of this invention resides in such compositions which are particularly applicable to the washing and polishing of automobile bodies and other such lacquered, enameled or painted surfaces.

As identified in the general statement of invention above, the three principal components of the composition embodying this invention are a non-soap detergent, the principal function of which is to provide the composition with an improved washing action for the surface to be cleaned, as distinguished from cleaning by abrasive action, an exhausting agent, which will exhaust on the surface to be washed and thereby prepare said surface for a lustrous top protective coating of the third ingredient, a water-insoluble thermoplastic resin.

The term "non-soap detergent," as employed herein, refers to those materials providing washing action, which are not identified as soaps or alkali metal salts of higher fatty acids, and which are synthetically prepared.

The expression "exhausting agent," as that term is employed herein, refers to a material which will migrate or exhaust from the washing solution onto the surface to be cleaned and which is characterized by a substantivity, i.e., affinity or self-adherability, to said surface or base material. Still further, these agents are characterized by their ability to anchor water-insoluble thermoplastic topcoat films to the surface during washing thereof. The ability to selectively anchor, that is, bind, the topcoat films while remaining compatible with the other ingredients of the formulation is a property unique to said exhausting agents and is critical for the success of the compositions of the invention. The exhausting agents are cationic and polymeric as further described hereinafter.

In accordance with the present invention, the non-soap detergent component of the formulation may be present therein in an amount of from about 0.25 to 30 parts by weight thereof, the exhausting agent may be present in parts by weight in substantially the same amounts, and the aqueous emulsion of the water-insoluble film-forming thermoplastic resin may be present in amounts of from about 1 to 90 parts my weight, preferably from about 5 to 50 parts by weight.

It will be readily appreciated that the relative amounts of these essential components can be varied greatly depending upon the amounts of water and other components present in the formulation. In general, the choice and amounts of exhausting agent and non-soap detergent in the formulation must be such as to insure good washing and good exhausting, but without significantly reducing or adversely affecting the luster of the finish achieved by the thermoplastic film in combination with the exhausting agent.

Additionally, the non-soap detergent employed should not be present in amounts such as will adversely affect the durability of the film to water, such as is encountered in normal weathering as from rain or snow or from occasional subsequent washing, as in the instance of an automobile body polished in accordance with this invention.

Additionally, great care should be taken in the selection of the non-soap detergent component insofar as the use of the final formulation is concerned. Thus, in general, non-ionic detergents have a tendency to attack painted surfaces and should thus be avoided where the formulation is to be applied to such surfaces, as for example, on automobile bodies.

The non-soap detergent may be selected from the known classes of detergents, namely, cationic, non-ionic, anionic, or amphoteric, and should be present in the formulation in amounts of from between 0.25 and 30 parts by weight. As examples of suitable cationic detergents, the following are illustrative: stearamidopropyldimethyl-beta-hydroxyethyl ammonium dihydrogen phosphate, stearamidopropyldimethyl-beta-hydroxyethyl ammonium nitrate, stearoguanamine, stearoguanamine ethylene oxide reaction products, octadecylamine salts of octadecyl carbamic acid and octadecyl guanamine salts of octadecyl carbamic acid, reacted with ethylene oxide, octadecylamine tetraethylene glycol, rosin amine ethylene oxide reaction products, and the like. Also included are undecylimidazoline and reaction products with ethylene oxide and propylene oxide, oleylaminodiethylamine hydrochloride, condensation products of fatty acids and degraded proteins, monostearylethylenediamine trimethylammonium sulfate, alkyl benzene imidazolines, cetyl pyridinium bromide, octadecyl pyrodinium sulfate or chloride, octadecylmethylene pyridinium acetate, laurylureaethylene oxid, methyl sulfate of dimethyl octadecyl sulfonium, condensates of halohydrins and amines, polyamines and ammonia, alkyl phosphonium compounds, alkyl phosphonium ethyleneoxide condensates, rosin amines condensed with ethylene oxide and propylene oxide.

As examples of suitable non-ionic detergents (not recommended for certain types of painted surfaces), the following are illustrative: nonylphenolpolyethyleneglycol, tall oil ethylene oxide condensate, tall oil ethanolamide ethylene oxide condensates, rosin acids plus ethylene oxide, rosin acid ethanolamide plus ethylene oxide, and the like.

As examples of anionic detergents or surface active agents, the alkali metal salts of sulfosuccinamic acid, such as those exemplified in U.S. Patents No. 2,438,092 and No. 2,283,314, may be used. They are: tetrasodium-N-(1,2 - dicarboxyethyl) - N-octadecyl sulfosuccinamate; disodium - N - octadecyl sulfosuccinamate; disodium-N-(1,2 - dimethylsuccino) - N - octadecyl sulfosuccinamate; sodium - N-octadecyl monoethyl sulfosuccinamate; disodium - N - di(2-ethylhexoxypropyl)sulfosuccinamate; and the like. This class of non-soap detergents is particularly preferred since these reagents promote excellent compatibility of the thermoplastic resin emulsion with the polymeric exhausting agent.

In addition, the alkyl esters of alkali metal salts of sulfosuccinic acid, such as the alkali metal salts of dialkyl sulfosuccinate, described in U.S. Patent No. 2,028,091, may be used. The following are illustrative of such materials: sodium bis[5,7,7 - trimethyl-2 - (1,1,3-trimethylbutyl)octyl]sulfosuccinate; sodium bis(n-hexadecyl)sulfosuccinate; sodium bis(2 - ethylhexyl)sulfosuccinate; sodium diamyl sulfosuccinate; sodium bis-(3,5,5 - trimethylhexyl)sulfosuccinate; sodium bis(7-ethyl-2 - methyl-4-undecyl)sulfosuccinate; sodium bis(5-ethyl - 2 - nonyl)sulfosuccinate; guanidine bis(2-ethylhexyl)sulfosuccinate; calcium bis(4 - methyl - 2 - pentyl) sulfosuccinate; sodium bis tridecyl sulfosuccinate; sodium bis(tridecylglycol ether)sulfosuccinate; sodium bis(1-methylheptyl)sulfosuccinate; sodium bis(isobutylhexyl) sulfosuccinate; sodium bis(3 - octadecanoyloxy - 2 - hydroxypropyl)sulfosuccinate; sodium bis(dodecylamidoethyl)sulfosuccinate; sodium bis(2,8 - dimethyl - 6-isobutyl-4-nonyl)sulfosuccinate; and the like.

In addition to dialkyl sulfosuccinates of the type exemplified above, monoalkyl sulfosuccinates are expressly contemplated. The following compounds are illustrative of this class of alkyl sulfosuccinate esters: disodium mono [5,7,7-trimethyl-2,1,1,3-trimethylbutyl octyl]sulfosuccinate; disodium mono(isobutylhexyl)sulfosuccinate; sodium octadecanol(oxoprocess alcohol)sulfosuccinate; disodium mono(3-octadecanoyloxy - 2 - hydroxypropyl)sulfosuccinate; and disodium mono(2,8-dimethyl-6-isobutyl-4-nonyl)sulfosuccinate; and the like.

It will be apparent that monoalkylaryloxylsulfosuccinates are also contemplated. Thus, for example, suitable detergents of this group include the following: disodium mono(nonylphenoxyethyl)sulfosuccinate; disodium mono (2,4-ditertiaryamylcyclohexyl)sulfosuccinate; disodium mono[3-methyl-3-(p-methylcyclohexyl)propyl]sulfosuccinate; disodium mono(4-isohexylhexahydrobenzyl)sulfosuccinate; and the like.

As examples of suitable polymers of alkyl sulfosuccinates employable within the purview of the present invention, the following are illustrative: sodium poly(2-ethylhexylene)sulfosuccinate; sodium poly(3-octadecanoyloxy-2-hydroxypropyl)sulfosuccinate; sodium polydodecylene sulfosuccinate; disodium polyoctadecylene sulfosuccinate; sodium poly(lauramidodiethanol)sulfosuccinate; disodium poly(stearamidotriethanol)sulfosuccinate; polyethylene glycol 400 modified di(sodium glycerylmonostearate sulfosuccinate); polyethylene glycol 1200 modified di(sodium tridecyl sulfosuccinate); sodium bis polypropylene glycol 2000 modified di(sodium tridecyl sulfosuccinate); sodium bis polypropylene glycol (P–2000)

sulfosuccinate; disodium monopolybutylene glycol (4000) sulfosuccinate; and the like. In general, polymeric succinic acid esters, including alkyl and alkyl aryl esters, contemplated for use in the present invention, are described and may be prepared in accordance with the procedure outlined in U.S. Patents Nos. 2,637,663; 2,489,943; and 2,454,546.

In addition to the preferred succinic acid esters and polymers thereof described hereinabove, other anionic detergents are contemplated for use in the present invention. As examples of such agents, the following are illustrative; sodium lauryl sulfate; sodium octadecylglycolsulfate; sodium heptadecylsulfate; sodium 7-ethyl-2-methyl undecyl-4-sulfate; sodium myristyl ethyleneglycolethersulfate; sodium nonylphenolpolyethyleneglycol sulfate; sodium dodecysulfonate; sodium dodecylbenzene sulfonate; sodium decyl naphthalene sulfonate; sodium oleylmethyltaurine sulfonate; sulfonated rosin or abietic acid; sulfated abietyl alcohol; sulfated fatty acid ethanolamides; and the like.

Among the amphoteric detergents that may be employed are cocoa-beta-alanine; (N-carboxymethyl-N-lauramidopropyl-N,N'-dimethylammonium inner carboxylate); cetyldimethylammonium inner carboxylate; methyl ester of dimethyl octadecyl betaine chloride; and the like.

In general, formulations of the present invention should be substantive to the surface being washed and finished. Thus, if the surface is negatively charged, the formulation should be characterized by a weaker negative charge or preferably a positive charge, and thus cationic in nature. Within relatively broad limits, this can be controlled by regulating the relative amounts of detergent and exhausting agent in the formulation.

Of the various classes of detergents or surface active agents employable in the present invention, cationic detergents and surface active agents, which are substantive to the surface to be washed and finished are most desirable.

The exhausting agents employable in this invention are normally used in the formulation in an amount of from between 0.25 and 30 parts by weight, or within a range equal to the relative amount of detergent employed. The exhausting agent is cationic and polymeric and may be characterized as either resinous or non-resinous. Of particular interest among the resinous exhausting agents are melamine-formaldehyde resins condensed with iminobispropylamine, such as is described in U.S. Patent Nos. 2,769,796 and 2,796,362, including hexamethylolmelamine condensed with iminobispropylamine.

Other cationic polymers employed as exhausting agents in the present invention include polyethyleneimine; urea-formaldehyde resins condensed with triethylenetetraamine, polyethyleneimine-formaldehyde condensates; condensation products of iminobispropylamine and ethylene dichloride; condensation products of octadecyl chloride with polyethyleneimine and treated with ethylene oxide; methylstyrene-methylvinylpyridine copolymer quaternized with benzyl chloride; methylstyrenemethylvinylpyridine copolymer quaternized with chloracetic acid; methylstyrene-methylvinylpyridine copolymer quaternized with methyl bromide; methylstyrene-methylvinylpyridine copolymer quaternized with epichlorohydrin; propylene-ethyleneimines copolymer condensate; condensates of glycerindichlorohydrin with triethanolamine; condensation products of halohydrin and ammonia; styrene-methylvinylpyridine copolymers quaternized with benzyl chloride; styrene-methylvinylpyridine copolymers quaternized with ethylene oxide and H_3PO_4; methylstyrene-methylvinylpyridine copolymers quaternized with propylene oxide and HNO_3; methylstyrene-dialkylmelamine copolymers; and the like.

The water-insoluble film-forming thermoplastic resin component is generally any such resin which may be emulsified in water to form so-called latices and which air-dry to a glossy film. These resins include polymers which form latices in water without modification with an internal or external plasticizer as well as polymers which require a plasticizer to promote water emulsions. Further, the film-forming thermoplastic material includes aqueous emulsions of prepolymerized thermoplastic resins as well as aqueous emulsions of emulsion-polymerized thermoplastic resins. A large variety of such resins are commercially available and are suitable for the practice of the present invention which is not limited to any particular resin of the class. Conventionally, these emulsions comprise from about 20% to 60% by weight polymer solids in water.

As illustrative of thermoplastic resins which emulsify in water without the use of plasticizers may be mentioned various acrylate polymers, including homopolymers of lower alkyl esters of acrylic acid and methacrylic acid and copolymers of these esters with acrylonitrile, styrene and various substituted styrenes, and the like. Thus, such resins include styrene-methylmethacrylate copolymers, styrene-butylacrylate copolymers, methylstyrene-acrylonitrile copolymers, styrene-butadiene copolymers; methylstyrene - methylvinylpyridine copolymers, polyethylene, polypropylene, and the like.

As illustrative of polymers modified with plasticizers to render such water-emulsifiable may be mentioned polyvinyl chloride, polyvinyl acetate, polyvinyl butyral, polystyrene and vinylchloride-vinylacetate copolymers modified with esters of phthalic acid anhydride (e.g., dioctyl phthalate, diisodecyl phthalate, butyloctyl phthalate, etc.), esters of adipic, azelaic or sebacic acid (e.g. di-(2-ethylhexyl)adipate, diisodecyl adipate, etc.) or phosphate esters (e.g., tricresyl phosphate, trioctyl phosphate, etc.).

While the aforementioned film-forming thermoplastic resins are critical ingredients in the present invention, the polishing waxes which they replace may be added in some formulations as optional materials, although no particular advantage is achieved thereby.

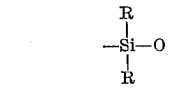
In general, such polishing waxes are of two varieties, namely, synthetic polishing waxes, particularly those derived from petroleum hydrocarbons, and the naturally occurring wax materials. The latter group is most representative of the known polishing wax materials and include carnauba, ouricury, candellila and esparto as representative of the better known hard finishing waxes. These materials may be employed singly or in combination with one another, as they frequently are in polish formulations. Frequently, such waxes are combined with softer waxes, whether naturally occurring or synthetic, in polish formulations to render the formulation more flexible or to reduce cost. As examples of such softer waxes, may be mentioned beeswax, ozocerite, refined montan, ceresin, Japan wax, and to some extent, refined paraffins.

In addition to plasticizers, solvents such as butyl Cellosolve acetate, methyl isobutyl ketone, methyl ethyl ketone may be employed in the present formulations in order to improve film-forming characteristics. When employed, plasticizers and solvents and other well-known agents of their type or their equivalents, are normally employed in amounts of from between about 1 and 20%, based on the dry weight of the protective thermoplastic resin of the formulation.

In addition to the protective coating material, detergent and exhausting agent, formulations of the present invention may contain various other ingredients known to be employed in such compositions, including pigments, clay, and the like, such as diatomaceous silica, tripoli bentonite and pumice. These ingredients in general function as mild abrasives to aid in the washing action of the detergent component. In general, such mild abrasives and other components of the cleaning formulations may be present in amounts of from between 0 to 10 parts by weight depending upon the particular application or purpose of the washing formulation.

Polysiloxanes may also be incorporated as optional and additional film-forming materials in the formulations of

he present invention. These polymers are, in general, multiples of the structure:



in which R is a hydrocarbon, preferably such as methyl, ethyl, or the like. They are discussed fully in Rochow: "Chemistry of Silicones" (1946). These silicone fluids may be characterized by a viscosity at 25° C. of from about 5 to 1,000,000 or more centistokes, but preferably are less than 10,000 and from between 100 and 500 centistokes at 25° C. When so used, amounts of from traces up to 10% by weight of the composition are employed.

If the formulation is to be stored in paste form for later use in aqueous media, only the water in the thermoplastic resin latex component need be present. The formulation may be blended in accordance with the description hereinafter to follow. If the formulation is for immediate use, it is prepared in the form of an aqueous colloidal solution, dispersion or emulsion, and may contain up to 90 parts by volume of water, the remainder being the active components of the formulation, including the detergent, exhausting agent and film-forming thermoplastic resin.

Whether the product is in paste form or in the form of an emulsion, it normally will be diluted with water before use by an operator. In this connection, a paste will normally dilute in an amount of from between ⅓ of an ounce to 100 ounces per gallon of water and, for most effective action, in an amount of from between 1 ounce to 50 ounces per gallon of water.

When the composition is already in the form of an aqueous fluid dispersion, containing, for example, 20% solids, it is normally diluted in parts by volume of from between 5 and 100 parts of water per part of product, and preferably in a ratio of between about 5 to 20 parts of water per part of product.

In order to more clearly illustrate the present invention, the following examples are given primarily by way of illustration. No details contained therein should be construed as limitations on the present invention, except insofar as they appear in the appended claims. All parts and percentages are by weight unless otherwise specifically designated.

Example 1

An aqueous emulsion was prepared employing the below-listed components.

Components:	Parts by weight
Protective coating material (aqueous emulsion containing ethylacrylate-styrene copolymer and carnauba wax):	
Solids	14
Water	76
Detergent (anionic)—tetrasodium - N-octadecyl-N-(dicarboxyethyl)sulfosuccinamate	5
Exhausting agent—melamine formaldehyde condensed with iminobispropylamine	5

This formulation was prepared by placing coating material which contains the suitable amount of water in a container equipped with mechanical stirrer. The detergent was then added slowly with good agitation, followed by

the exhausting agent. The detergent may also be first admixed with exhausting agent followed by admixture with the coating material. It is important that the components be mixed as indicated in order to avoid the precipitation or coagulation which results when coating material and exhausting agent are mixed first. Stirring was continued for a short time to insure uniformity and maintenance of a small particle size emulsion. It was then ready for use.

Example 2

The following emulsion composition was prepared in accordance with the procedure set forth in Example 1.

Components:	Parts by weight
Protective coating material (aqueous emulsion containing ethylacrylate-styrene copolymer and carnauba wax):	
Solids	14
Water	76
Detergent (cationic)—stearamidopropyldimethylbeta - hydroxyethylammonium dihydrogen phosphate	5
Exhausting agent—melamine formaldehyde condensed with iminobispropylamine	5

Example 3

The compositions of Examples 1 and 2 above were compared with a commercially available cleaner-polisher shampoo composition suitable for use on automobile bodies. The formulation suitable for use on automobile bodies identified hereinbelow as formulation A contains an anionic detergent and carnauba wax.

The formulations of Examples 1 and 2 were applied to an enameled metal panel soiled with carbon black and mineral oil and formulation A was applied to a similar soiled enameled metal panel. After application in each of the illustrated examples, the finish was allowed to dry, and thereafter evaluated for the various qualities referred to in Table I. The values reported were obtained by visual examination of the panels before and after application of the compositions identified. The test for durability involved spraying the panels with tap water for a period of time, allowing them to dry and observing them visually. These results are recorded in Table I hereinbelow.

TABLE I

Formulation	Appearance Before Washing	Appearance After Washing	Luster	Streakiness	Tendency to Mark	Durability
Example 1	Dirty	Clean	Good	Slight	Very little	Fair.
Example 2	do	do	do	Very slight	None	Good.
Formulation A	do	do	None	None	do	None.

Table I hereinabove illustrates that the formulations of Examples 1 and 2 are, in general, markedly superior as a washing and polishing formulation as compared to commercial formulation A, particularly with respect to luster durability.

Examples 4–11 hereinbelow illustrate various formulations of the invention, prepared substantially as in Examples 1 and 2.

Example 4

Components:	Parts by weight
Protective coating material (copolymer of 90 parts of styrene and 10 parts of ethylacrylate as an aqueous emulsion):	
Solids	15
Water	77.5
Detergent (anionic)—tetrasodium-N-octadecyl-N-(dicarboxyethyl) sulfosuccinate	3.5
Exhausting agent—urea-formaldehyde resin condensed with triethylenetetraamine	4.0

Example 5

Components:

Protective coating material—copolymer of 45 parts of styrene and 10 parts of ethylacrylate as an aqueous emulsion:

Solids	39
Water	26
Water	23

Detergent:

Anionic—tetrasodium - N - ocetadecyl - N-(dicarboxyethyl)sulfosuccinamate	3.5
Cationic — stearamidopropyldimethylbeta-hydroxyethylammonium dihydrogen phosphate	5.0
Exhausting agent—melamine formaldehyde condensed with iminobispropylamine	2.5

Example 6

Components:

Protective coating material—mixture of 40 parts of polystyrene and 10 parts of dibutyl phthalate as an aqueous emulsion:

Solids	48
Water	42

Detergent

Amphoteric—cocoa-beta-alanine	4.0
Cationic — stearamidopropyldimethylbeta-hydroxyethylammonium dihydrogen phosphate	3.0
Exhausting agent—melamine formaldehyde condensed with iminobispropylamine	3.0

Example 7

Components:

Protective coating material—copolymer of 30 parts of methylstyrene and 10 parts of ethylacrylate mixed with 5 parts of dibutyl phthalate as an aqueous emulsion:

Solids	53.5
Water	28.5
Detergent (anionic)—disodium-N-octadecyl-sulfosuccinamate	5
Exhausting agent—melamine formaldehyde condensed with iminobispropylamine	3

Example 8

Components:

Protective coating material—a copolymer of 30 parts of methylmethacrylate and 5 parts of ethylacrylate as an aqueous emulsion:

Solids	43
Water	39
Detergent (anionic—tetrasodium-N-octadecyl-N-(dicarboxyethyl) sulfosuccinamate	5

Exhausting agents:

Styrene - methylvinylpyridine copolymer quaternized with benzyl chloride	10
Melamine formaldehyde condensate condensed with iminobispropylamine	3

Example 9

Components:

Protective coating material—styrene-butadiene copolymer:

Solids	50
Water	40
Detergent (non-ionic)—nonylphenolethylene oxide condensate (100%)	5
Exhausting agent—melamine formaldehyde condensate further condensed with iminobispropylamine (30% solids)	5

Example 10

Components:

Protective coating material—methylstyrene-ethylacrylate copolymer emulsion:

Solids	39
Water	54
Detergent (anionic)—tetrasodium-N-octadecyl-N-(dicarboxyethyl) sulfosuccinamate	5
Exhausting agent—polyethyleneimine condensed with formaldehyde	5

Example 11

Components:

Protective coating material — ethylacrylate-styrene copolymer:

Solids	15
Water	75
Detergent (anionic—tetrasodium - N - octadecyl-N-(dicarboxyethyl) sulfosuccinamate	5
Exhausting agent—melamine formaldehyde condensed with iminobispropylamine	5

As will be seen from the general description set forth hereinabove, the present invention is characterized by a principle of general scope which is applicable to a number of industrial problems. Thus, presently in the textile, metal, household, and industrial laundering fields, cleaning or washing is one separate operation, while polishing, softening, coating, water proofing, rust proofing, and numerous other specific aspects are normally achieved in a separate operation. By the application of the principle of this invention, separate operations of this type may be accomplished in a single treatment, namely, during a washing operation.

Example 12

As indicated in Example 1 the method of preparing the compositions of the invention is critical for avoidance of coagulation of the coating material and cationic exhausting agent and to ensure particle size in the resulting emulsion small enough (about 500 angstroms or less) for a smooth and uniform coating composition. Heretofore this object has not been obtainable as demonstrated with the following compositions wherein the amounts are in parts by weight:

TABLE II

Compositions	A	B	C
Protective coating material: Ethylacrylate-methylmethacrylate copolymer latex (40% solids)	95		
Wax emulsion [1]		50	50
Exhausting agent: Melamine-formaldehyde resin condensed with iminobispropylamine	5	5	5
Detergent: Tetrasodium N-octadecyl-N- (dicarboxyethyl) sulfosuccinamate			2
Water added		45	43

[1] Mixture of carnauba wax and esparto wax as described in Example 1 of U.S. Patent 2,780,554 to Lerner.

It was attempted to prepare composition A by diluting the latex with water and adding the exhausting agent with slow stirring. Gelation and coagulation resulted, even when the latex mixture was added to the exhausting agent. However, when the non-soap detergent was first admixed with the exhausting agent or the latex mixture, followed by the other of exhausting agent or latex mixture, a smooth, uniform, compatible composition resulted. By substituting nonionic polymeric methylated hexakismethylol melamine for the exhausting agent above, some degree of compatibility could be achieved without a non-soap detergent but not a commercially acceptable compatbility. When the same polymeric methylated hexakismethylol melamine is made cationic by condensation with iminobispropylamine, it is still incompatible with the latex unless the non-soap detergent is present by initial mixture with exhausting agent or latex mixture.

An attempt was next made (composition B) to prepare a compatible mixture of a wax emulsion and, as a substitute for the "WSCD 18D" and "WSCED–QAS–2C" of Example 1 of U.S. Patent 2,780,554 to Lerner, the instant exhausting agent. The mixture immediately coagulated. However, when the non-soap detergent was first mixed with the exhausting agent, the wax emulsion became compatible therewith (composition C).

While this example illustrates that a latex can be made compatible with a cationic polymeric exhausting agent preferably by mixing a non-soap detergent with the exhausting agent followed by admixture with the latex, it is also within the scope of the invention to achieve compatibility by mixing the non-soap detergent with the latex, then adding the exhausting agent, or by concurrently admixing latex, non-soap detergent, and exhausting agent at a rate effective to prevent gellation or coagulation of the ingredients. Thus, as a general rule, the composition is prepared by any sequence of admixture, step-wise or concurrent, whereby the non-soap detergent is present in an amount effective for preventing gellation or coagulation of latex and exhausting agent. Moreover, the term "mixing" or like term is intended to include addition of non-soap detergent to exhausting agent or vice versa or addition of non-soap detergent to latex or vice versa.

I claim:

1. A washing and polishing composition for washing a surface and leaving thereon a durable, lustrous film which comprises a mixture of (1) from about 0.25 to 30 parts by weight of a non-soap detergent, (2) from about 0.25 to 30 parts by weight of a polymeric cationic exhausting agent and (3) from about 1 to 90 parts by weight of an aqueous emulsion of a substantially water-insoluble film-forming vinyl thermoplastic resin, said composition being prepared by a sequence of admixture wherein (1) is continuously present in an amount effective to prevent gellation or coagulation of the admixture of (2) and (3); and wherein said polymeric cationic exhausting agents are selected from:

melamine-formaldehyde-polyalkylene-polyamine resins;
polyethyleneimine;
urea-formaldehyde resins condensed with triethylenetetramine;
polyethyleneimine-formaldehyde condensates;
iminobispropylamine-ethylene dichloride condensates;
octadecyl chloride-polyethyleneimine condensates treated with ethylene oxide;
quaternized methylstyrene-methylvinylpyridine copolymers;
propylene-ethyleneimine copolymer condensate;
glycerindichlorohydrin-triethanolamine condensates;
halohydrin-ammonia condensates;
quaternized styrene-methylvinylpyridine copolymers; and
methylstyrene-dialkylmelamine copolymers.

2. The composition of claim 1 wherein said exhausting agent is a melamine-formaldehyde resin condensed with iminobispropylamine.

3. The composition of claim 1 wherein said non-soap detergent is tetrasodium N-octadecyl-N-(dicarboxyethyl) sulfosuccinamate.

4. A method of rendering compatible (1) an aqueous emulsion of a substantially water-insoluble film-forming thermoplastic vinyl resin and (2) a polymeric cationic exhausting agent which comprises maintaining in the presence of (1) or (2), prior to or simultaneously with admixture thereof, a non-soap detergent, wherein the amounts of non-soap detergent, exhausting agent and vinyl resin emulsion are, respectively from about 0.25–30 parts by weight, from about 0.25–30 parts by weight and from about 1–90 parts by weight; and wherein said polymeric cationic exhausting agents are selected from:

melamine-formaldehyde-polyalkylene-polyamine resins;
polyethyleneimine;
urea-formaldehyde resins condensed with triethylenetetramine;
polyethyleneimine-formaldehyde condensates;
iminobispropylamine-ethylene dichloride condensates;
octadecyl chloride-polyethyleneimine condensates treated with ethylene oxide;
quaternized methylstyrene-methylvinylpyridine copolymers;
propylene-ethyleneimine copolymer condensate;
glycerindichlorohydrin-triethanolamine condensates;
halohydrin-ammonia condensates;
quaternized styrene-methylvinylpyridine copolymers; and
methylstyrene-dialkylmelamine copolymers.

5. The method of claim 4 wherein the non-soap detergent is first admixed with (2), followed by admixture with (1).

6. The method of claim 4 wherein (2) is a melamine-formaldehyde resin condensed with iminobispropylamine.

7. The method of claim 4 wherein the non-soap detergent is tetrasodium N-octadecyl-N-(dicarboxyethyl)sulfosuccinamate.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,329,637 July 4, 1967

Emil Alfred Vitalis

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 48, for "insluble" read -- insoluble --; column 3, line 74, for "oxid" read -- oxide --; column 6, line 18, after "copolymers," insert -- methylstyrene-methylmethacrylate copolymers, --; column 9, line 10, for "ocetadecyl" read -- octadecyl --; column 10, lines 70 and 71, for "compatbility" read -- compatibility --; column 11, line 3, for "WSCD" read -- WSCED --.

Signed and sealed this 21st day of January 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents