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HOUSEHOLD BLEACH HAVING STABLE OPACIFIER

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ABSTRACT OF THE DISCLOSURE

Liquid household bleach having visual opacity is provided by the incorporation into the bleach of a certain styrene-vinyl acid-vinyl sulfonate terpolymer latex which is highly resistant to deterioration in the bleach. The latex is prepared by introduction of styrene monomer into a preformed aqueous solution of the vinyl acid and vinyl sulfonate and a noncationic surfactant.

BACKGROUND OF THE INVENTION

(1) Field of the invention

This invention has to do with household liquid bleach. The invention is particularly concerned with household bleach of the sort ordinarily added to detergent containing water for the purpose of whitening fabrics being washed. For the most part, liquid household bleach comprises a highly alkaline solution of sodium hypochlorite usually having an appreciable available chlorine content and a pH of 10 or more. More recently, other sources of hypochlorite ion have been developed, primarily for solid bleaches sold in tablet form. Such materials e.g. trichlorocyanurates may, however, be sold as liquid bleaches and may take advantage of the present invention.

Liquid household bleaches now on the market are watery-appearing, slightly tinted fluids. It has been found that consumer reaction is less favorable to watery products than to equally effective products which have a degree of body giving them an appearance of greater substance.

(2) Prior art

In the liquid detergent field, finely particulate resins are added to the aqueous or alcoholic detergent solution to impart visual opacity and pleasing body and coloration.

Attempts to opacity liquid household bleach have not been successful in the past because of instability of the opacifying resin latex in the harsh environment presented by liquid bleach. Great alkalinity, combined with the presence of chlorine ion appears to destroy the latex through decomposition of the resin or of the emulsifying agents. Thus, even resins having known stability to chlorine-containing solutions, such as polystyrene, have not proved useful as opacifiers, because of the inability of the polymer to remain dispersed in the bleach solution for a period of time equal to storage, shipping and shelf time, expectably encountered in the normal marketing of bleach.

SUMMARY OF THE INVENTION

It is a major objective of the present invention to provide liquid household bleach stably opacified for a more substantial and attractive appearance.

Accordingly, there is provided a liquid household bleach comprising an aqueous, highly alkaline solution containing hypochlorite ion and a latex of finely particulate synthetic organic polymer consisting essentially of a styrene monomer which has been emulsion polymerized at an elevated temperature following addition to an aqueous solution of a vinyl acid, vinyl sulfonate and a noncationic surfactant. The polymer typically contains copolymerized from 65 to 97.5 parts of the styrene monomer, 2 to 34.5 and preferably 8 to 12 parts of vinyl acid and 0.5 to 25, preferably 0.5 to 5 parts of a water soluble vinyl sulfonate per 100 parts of the polymer, by weight. In general, the polymer is of opacifying size range e.g. 0.5 to 2 microns in average particle size and is present in amounts between 0.005 and 5 percent by weight. The styrene component of the polymer may be styrene per se i.e. vinyl benzene, or other styrene having up to 12 carbon atoms and possibly monohalogen substituted as in chlorostyrene. The vinyl acid component of the polymer may be an α,β ethylenically unsaturated monocarboxylic acid containing from 3 to 4 carbon atoms, i.e. acrylic or methacrylic acid. From 0.5 to 25 parts by weight of a hydrophylic acrylic acid derivative comonomer may replace a corresponding portion of the styrene component in the polymer, primarily to increase particle size. These comonomers may be the hydroxyesters, ethers, amides and cyano derivatives of acrylic and methacrylic acids. Preferably from 5 to 10 parts by weight of the hydroxyalkyl derivative of methacrylic acid in which the alkyl group contains from 1 to 4 carbon atoms is used in replacement of a corresponding portion of the styrene component of the polymer. The vinyl sulfonate is a water soluble salt of a sulfonic acid containing up to 10 carbon atoms.

The liquid household bleach is, except for the presence of the specified opacifier, typical of commercially available products and accordingly will have a pH of 10 or more and a hypochlorite ion concentration of 1 to 10 percent by weight, generally derived from sodium hypochlorite.

A noncationic surfactant is used to form the polymer latex. Typical surfactants are anionic materials, e.g. polyalkylene oxide derivatives of alkylene glycols or phenols.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The liquid household bleach opacified in accordance with this invention may be any hypochlorite ion containing solution containing sufficient free alkali to have a pH of 10 and preferably 11.5 and higher, typically from 0.1 to 1.0% by weight free alkali. Percent concentrations of hypochlorite ion will range between 1 and 10 percent by weight with a practical minimum being 2.5%. Most bleaches fall between 3 and 7% hypochlorite ion, and this concentration is most suited to use of the invention. As mentioned above various bleaching agents including the heterocyclic N-chlorimides such as the following are useful herein: trichlorocyanurates acid, dichlorocyanurates acid and salts thereof such as the alkali metal salts e.g. sodium and potassium tri-acid dichlorocyanurates. Other imides are hypochlorite ion generating also in aqueous solution and may be used e.g. N-chlorosuccinimide, N-chloromalonimide, N-chlorphthalimide and N-chloronaphthalimide. Other materials are the hydantoins e.g. the 1,3-dichloro - 5,5 - dimethyl hydantoin, N-monochloro-C, C-dimethylhydantoin, methylene bis (N-chloro-C, C-dimethylhydantoin), 1,3-dichloro - 5 - methyl-5-isobutyldimethylhydantoin, 1,3-dichloro-5 methyl - 5 - ethylhydantoin, 1,3 - dichloro-5-methyl-5n-amylhydantoin and the like as well as trichloromelamine. Preferred sources of hypochlorite ion are the water soluble inorganic salts such as lithium, calcium, potassium and particularly sodium hypochlorite.

The opacifying polymer is a particulate form of a styrene copolymer formed in a critical manner. It has been found that most polymer latices prepared from a styrene, a vinyl acid and a vinyl sulfonate within the proportions herein described and with or without a fourth monomer such as a vinyl acid ester are not stable in highly alkaline, liquid bleach compositions. Surprisingly the same proportions of monomers provide vastly different opacifying benefits depending on the polymerization

technique employed. To get useful latices of particulate styrene copolymer for opacifying bleach it has been found essential to first form a solution of the vinyl acid monomer and vinyl sulfonate monomer in water and the noncationic surfactant prior to adding the styrene monomer to the reaction vessel. In this manner a latex having styrene terpolymer finely dispersed therethrough is obtained which is stable for long periods even at elevated temperatures in liquid household bleach.

As the polymer components there may be employed styrene per se or vinyl benzene or a substituted styrene such as vinyl toluene or butyl styrene i.e. alkyl substituted styrenes in which the alkyl groups contain from 1 to 4 carbon atoms such that the styrene monomer contains from 8 to 12 carbon atoms, inclusive. Or the styrene monomer may be monohalogen ring substituted such as chlorostyrene or bromostyrene. The water soluble vinyl sulfonate monomer has the formula

$$R—CH=CH—So_3Me$$

in which R is a hydrocarbon radical free of aliphatic unsaturation having up to 10 carbon atoms e.g. an aromatic radical such as tolyl, benzyl or phenyl radical; an alkyl radical such as methyl, ethyl, propyl, butyl, isobutyl, pentyl, neopentyl, hexyl, heptyl, octyl, 2-ethyl hexyl, nonyl and decyl, or hydrogen and Me is an alkali metal e.g. sodium, potassium, lithium and cesium. The vinyl acid component may be described generically as a water soluble α,β ethylenically unsaturated monocarboxylic acid, i.e. acrylic or methacrylic acids. The proportions of styrene monomer, vinyl sulfonate monomer and vinyl acid monomer are from 65 to 97.5 parts styrene from 0.5 to 25 parts vinyl sulfonate and from 2 to 34.5 parts of the vinyl acid per 100 parts by weight of the terpolymer.

Polymerization is carried out as hereinafter described to provide polymer particles ranging in size between 0.5 and 2 microns. It is often desirable to incorporate a fourth monomer in the polymer. This fourth monomer will be a hydrophylic acrylic monomer such as a derivative of methacrylic or acrylic acid and free of carboxyl groups. Thus, such derivatives as the ester, hydroxyester, ether, amide or cyano derivatives of acrylic or methacrylic acids may be used in amounts of from 0.5 to 25 parts by weight and preferably between 5 and 10 parts by weight, in substitution for an equal weight amount of the styrene monomer, per 100 parts of the final opacifying polymer. Specific termonomers of choice include the hydroxyalkyl esters of methacrylic acid in which the alkyl group contains from 1 to 4 carbon atoms and particularly hydroxyethyl and hydroxypropyl methacrylate, and acrylamide, methacrylamide, acrylonitrile and methyl vinyl ether.

The monomers just described are emulsion polymerized using conventional catalysts, oxidizers or reducers, temperatures and pressures but with the critical step of first dissolving the water soluble vinyl acid and vinyl sulfonate in water, suitably with the emulsifying surfactant, prior to addition of the styrene. If used, the vinyl acid derivative fourth monomer should also be predissolved in water prior to introduction of styrene into the reaction vessel. Apart from the just-mentioned sequence of reactant introduction, the preparation of the polymers useful as opacifiers herein is carried out as for any other exothermic emulsion polymerization. Thus an aqueous solution of a suitable surfactant is mixed with the water soluble vinyl acid. Thereafter the water insoluble styrene reactant is mixed in and agitated until emulsified as the oil phase. The emulsion is then maintained at an elevated temperature through exothermic and/or added heat in admixture with a suitable catalyst e.g. and preferably water soluble persulfates such as ammonium and sodium and potassium persulfate and peroxides e.g. hydrogen peroxide; and also catalysts such as t-butyl perbenzoate and t-butyl hydroperoxide, as well as other oil soluble materials such as bisazobutyronitrile and cumene hydroperoxide. Following reaction for the required period and at temperatures between 100° F. and boiling the reaction mixture is cooled and neutralized with alkali. The latex may be spray or otherwise dried without loss of dispersibility or stability in liquid household bleach.

As noted, polymers prepared using conventional procedures and from the same reactants and proportions are not stable in liquid household bleach but rapidly deteriorate in particle size and appear to disintegrate. While not wishing to be bound to any particular theory concerning the operation of the invention it is believed that the unusual resistance of the presently disclosed compositions to deterioration in bleach may be attributable to the favoring of reaction of the vinyl acid first in the reactor, followed relatively by the polymerization of the styrene monomer, resulting in a relative styrene richness at the surface of the obtained polymer beads, and a relative vinyl acid richness at the core of the beads. Styrene homopolymer is not satisfactory, of course, as a bleach opacifier, because it is not capable of stable dispersion in the bleach solution, since it lacks polarity. Suitable surfactants for effecting emulsion polymerization as described and/or for suspending the finely particulate polymer in bleach are the noncationic types i.e. anionic, nonionic or amphoteric. Various of these surfactants will show greater or less tolerance for the harsh environment of liquid household bleach, depending on the concentration and pH thereof.

Among suitable surfactants are anionic aromatic compounds, e.g. water-soluble higher alkyl aryl sulfonates particularly those having from 8 to about 15 carbon atoms in the alkyl group. It is preferred to use the higher alkyl benzene sulfonates, although other mononuclear aryl nuclei, such as toluene, xylene, or phenol, may be used also. The higher alkyl substituent on the aromatic nucleus may be branched or straight-chained in structure, examples of such group being nonyl, dodecyl and pentadecyl groups derived from polymers of lower mono-olefins, decyl, keryl, and the like.

Illustrative of suitable aliphatic anionic compounds are the normal and secondary higher alkyl sulfates, particularly those having about 8 to 15 carbons in the fatty alcohol residue, such as lauryl (or coconut fatty alcohol) sulfate. Other suitable members of this class are the sulfuric acid esters of polyhydric alcohols incompletely esterified with higher fatty acids; the oleic acid ester of isethionic acid; the higher fatty acid (e.g. coconut) ethanolamide sulfates; the higher fatty acid amides of amino alkyl sulfonic acids, e.g. lauric acid amide of taurine; and the like.

These sulfates and sulfonates are used in the form of their water-soluble salts, such as the alkali metal and nitrogen-containing, e.g. lower alkylolamine, salts. Examples are the sodium, potassium, ammonium, isopropanolamine, mono- and tri-ethanolamine salts of said higher alkyl benzene sulfonate, higher alkyl sulfate and the like.

Typical specific examples are: the sodium salt of a sulfate ester of an alkylphenoxypoly (ethyleneoxy) ethanol, the ammonium salt of this sulfate ester, sodium methyl oleyl taurate, sodium alkyl naphthalene sulfonate, alkyl acyl sodium sulfonate, sodium tetraphydronaphthalene sulfonate, sodium alkyl aryl sulfonate, alkyl amido sulfate, cocomonoglyceride sulfate, dodecylbenzene sodium sulfonate, dodecylbenzene sulfonic acid, tridecylbenzene sodium sulfonate, fatty alcohol sodium sulfate, sodium dodecyl diphenyl oxide disulfonate, sulfonated castor oil, polyethoxyalkyl phenol sulfonate triethanolamine salts, sodium triethanolamine alkyl aryl sulfonate, magnesium lauryl sulfate, potassium lauryl sulfate, sodium lauryl ether sulfate, ammonium lauryl ether sulfate, sodium tallow sulfate, dodecylbenzene sodium sulfonate, oleyl methyl tauride, ammonium lauryl sulfate, amide sulfonate, and the like.

In general, suitable nonionic surfactants include those such as produced by the introduction of alkylene oxide group into an organic hydrophobic compound or group having an aliphatic or aromatic structure. The hydrophobic organic group generally contains at least 8 carbon atoms and up to about 30 carbon atoms. Condensed with the hydrophobic group are at least 5 and preferably up to about 50 alkylene oxide groups. It is preferred to use the polyoxyethylene condensates derived from ethylene oxide. It is preferred to use the polyalkylene oxide condensates of alkyl phenol, such as the polyoxyethylene ethers of alkyl phenols having an alkyl group of at least about six, and usually about 8 to 12 carbons, and preferably 8 to 9 carbon atoms, and an ethylene oxide ratio (No. of moles per phenol) of about 7.5, 8.5, 11.5 or 20, though the number of ethylene oxide groups will be usually from about 8 to 40. The alkyl substituent on the aromatic nucleus may be di-isobutylene, diamyl, polymerized propylene, dimerized C_6–C_7 olefin, and the like.

Further suitable nonionics are the polyoxyalkylene esters of organic acids, such as the higher fatty acids, rosin acids, tall oil acids, or acids from the oxidation of petroleum, et cetera. These polyglycol esters will contain usually from about 12 to about 30 moles of ethylene oxide or its equivalent and about 8 to 22 carbons in the acyl group. Suitable products are refined tall oil condensed with 16 or 20 ethylene oxide groups, or similar polyglycol esters of lauric, stearic, oleic acids, etc.

Additional nonionic agents are the polyalkylene oxide condensates with higher fatty acid amides, such as the higher fatty acid primary amides, mono- and di-ethanolamides. Suitable agents are coconut fatty acid amide condensed with about 10 to 50 moles of ethylene oxide. The fatty acyl group will have similarly about 8 to 22 carbons, and usually about 10 to 18 carbon atoms, in such products. The corresponding sulfonamides may be used also if desired.

Other suitable polyether nonionics are the polyalkylene oxide ethers of high aliphatic alcohols. Suitable fatty alcohols having a hydrophobic character, preferably 8 to 22 carbons, are lauryl, myristyl, cetyl, stearyl and oleyl alcohols which may be condensed with an appropriate amount of ethylene oxide, such as at least about 6, and preferably about 10 to 30 moles. A typical product is oleyl alcohol condensed with about 12, 15 or 20 moles of ethylene oxide. The corresponding higher alkyl mercaptans or thioalcohols condensed with ethylene oxide are suitable in the present invention also. The water-soluble polyoxyethylene condensates with hydrophobic polyoxypropylene glycols may be employed also, e.g. the ethylene oxide condensates with condensates of propylene oxide and propylene glycol.

Further suitable nonionic materials are the higher fatty acid alkanolamides, such as the monoethanolamides, diethanolamides and isopropanolamides wherein the acyl radical has about 10 to 14 carbon atoms and amine oxides. Examples are coconut (or equivalent lauric), capric and myristic diethanolamide, monoethanolamide and isopropanolamide, dodecyl dimethyl amine oxide and dimethyl acetoxyalkylamine oxide where alkyl is C_{11}–C_{14}.

Generally, these surfactants comprise from 0.05 to 10 percent by weight, and preferably from 0.5 to 3% of the reaction mixture and the latex added to the liquid household bleach.

The invention is illustrated by the following examples, in which all parts are by weight.

EXAMPLE 1

(A) Polymer preparation

Dissolve one part of dioctyl ester of sodium sulfosuccinic acid in 750 parts of water. Add and dissolve 50 parts of methacrylic acid and 10 parts of sodium vinyl sulfonate. Following achieving complete solution, add 500 parts of vinyl toluene. Apply heat to raise the mixture temperature to 105° F. Add one-half part sodium persulfate (initiator) and one-tenth part sodium formaldehyde sulfoxylate (reducing agent) were added. Increase the temperature to 200° F. Thereafter reaction is completed and the reaction mixture cooled, neutralized with potassium hydroxide and filtered. Polymer particles were in the range of 0.5 to 2 microns in particle size. The product may be spray dried for subsequent incorporation into dry bleach products, or the aqueous suspension may be added to liquid bleach.

(B) Liquid bleach opacification

One part of the latex obtained in A was mixed with 100 parts of a 5% aqueous solution of sodium hypochlorite having a pH of 11.5 to opacify the same. After 3 months at 90° F. the bleach was still opacified, and the loss of available chlorine was comparable to a non-opacified bleach.

Control I

Example 1 was duplicated but the methacrylic acid was mixed first with styrene and then added to the aqueous surfactant solution, followed by heating to polymerize. In part B, the emulsion which had similar size particles and the same milky appearance prior to addition to the bleach as the example emulsion, showed immediate physical deterioration and quickly demulsified and settled as a flocculated mass in the holding vessel.

EXAMPLE 2

(A) Dissolve one part of the dioctyl ester of sodium sulfosuccinic acid in 750 parts of water. Add 50 parts of acrylic acid and 5 parts of potassium styrene sulfonate. Add fifty parts of styrene and emulsify with heating to 120° F. and addition of 1 part of ammonium persulfate and one part sodium bisulfite. After the temperature rises exothermically to 140–150° F. add an additional 450 parts of styrene over a two hour period, with the temperature held by cooling at 160–170° F. Cool the completed latex to room temperature, neutralize and filter.

(B) The product of A stably opacifies liquid household bleach.

EXAMPLE 3

Parts A and B of Example 1 are duplicated using butyl styrene for vinyl toluene. A stable opacified bleach is obtained.

EXAMPLE 4

Example 1 is duplicated but omitting addition of sodium vinyl sulfonate. A fine latex is obtained which is useful in opacifying bleach. Increased quantities of the latex, relative to those used in Example 1 are required to obtain equivalent opacity to Example 1. Stability at 90° is less than two months.

Control II

Example 1 was duplicated but reducing the amount of methacrylic acid to 10 parts (0.5%) well below the minimum required herein. The latex obtained was stable for only two weeks in the test bleach solution.

EXAMPLE 5

Example 1 is duplicated but reducing the styrene to 400 parts and substituting 100 parts of hydroxyethyl methacrylate. The latex obtained is highly stable in bleach.

Whitening tests

Whitening tests were made with aqueous bleach containing 5.25% by weight sodium hypochlorite and 0.4% by weight of opacifying latex prepared in Example 1A. Swatches of nylon, cotton and Dacron were washed in a conventional home automatic washer. Other swatches of the same cloths were washed in the same bleach without added opacifier. Evaluation of whitening was made by a panel of persons after the first, third and fifth washing. In each instance the panel found superior whitening in the swatches washed with bleach containing opacifier.

The Gardner Color Diffuse Meter also showed that the opacified bleach washed samples were whiter.

Chlorine stability tests

Samples of bleach with and without opacifier stored in unpigmented polyethylene bottles were measured for available chlorine to determine the contribution of the opacifier to bleach stability. After 60 and 120 days at 90° F. under fluorescent lamp illumination these results were obtained.

	Available chlorine, g./l.		
	Initial	After 60 days	After 120 days
Example 1B bleach	66.1	59	55
Control (no opacifier)	67.2	59.4	48

The stabilizing effect is apparent from these data.

Additional samples were given north exposure on the building roof to the local weather. The non-opacified clear polyethylene bottle bleach experienced a loss of available chlorine from 66 g./l. to 45 g./l. in 7 days.

The opacified, clear polyethylene bottle bleach also having 66 g./l. available chlorine at the start of the test had 54 g./l. available chlorine after 7 days of exposure.

I claim:

1. Liquid household bleach having visual opacity and comprising an aqueous, highly alkaline solution consisting essentially of 1 to 10% by weight hypochlorite ion and above 0.005% by weight of a latex of finely particulate synthetic organic terpolymer consisting essentially of (1) a styrene monomer containing from 8 to 12 carbon atoms inclusive which has been emulsion polymerized at an elevated temperature following addition to an aqueous solution of (2) an α,β ethylenically unsaturated monocarboxylic acid containing from 3 to 4 carbon atoms, (3) a water soluble vinyl sulfonate having the formula R—CH=CH—SO_3Me in which Me is an alkali metal, R is a hydrocarbon radical free of aliphatic unsaturation and containing up to 10 carbon atoms and a noncationic surfactant, said polymer consisting essentially of copolymerized per 100 parts by weight from 65 to 97.5 parts of the styrene monomer, from 2 to 34.5 parts by weight of the acid and from 0.5 to 25 parts of the vinyl sulfonate.

2. Liquid household bleach according to claim **1** in which said styrene monomer is vinyl benzene.

3. Liquid household bleach according to claim **1** in which said acid is acrylic acid.

4. Liquid household bleach according to claim **1** in which said acid is methacrylic acid.

5. Liquid household bleach according to claim **1** in which said polymer has a particle size between 0.5 and 2 microns.

6. Liquid household bleach according to claim **5** in which said polymer latex is present in said bleach in an amount between 0.005 and 5 percent by weight.

7. Liquid household bleach according to claim **1** including also from 0.5 to 25 parts of a hydrophylic acrylic comonomer selected from the hydroxyester, ether, amide and cyano derivatives of methacrylic and acrylic acids in substitution of corresponding portion of the styrene monomer.

8. Liquid household bleach according to claim **6** including sodium hypochlorite as source of hypochlorite ion.

9. Liquid household bleach according to claim **8** in which said bleach has a pH above 10.

10. Liquid household bleach according to claim **7** in which the comonomer is present in an amount between 5 and 10 parts and is an hydroxyalkyl ester of methacrylic acid in which the alkyl group contains from 1 to 4 carbon atoms and said vinyl acid is present in an amount between 8 and 12 parts per 100 parts of said polymer.

11. Liquid household bleach according to claim **10** in which said bleach is a solution of sodium hypochlorite having a pH above 10 and in which said styrene monomer is vinyl benzene and said vinyl sulfonate is an alkali metal vinyl sulfonate.

12. Liquid household bleach according to claim **11** in which said surfactant is nonionic.

13. Liquid household bleach according to claim **12** in which said surfactant is a polyalkylene oxide derivative of an alkylene glycol.

14. Liquid household bleach according to claim **12** in which said surfactant is a polyalkylene oxide derivative of a phenol.

15. Liquid household bleach according to claim **11** in which said surfactant is anionic.

16. Liquid household bleach according to claim **15** in which said surfactant is a dialkyl ester of sodium sulfosuccinic acid in which the alkyl groups each contain from 1 to 10 carbon atoms.

17. Liquid household bleach according to claim **16** in which the alkyl groups are each octyl groups.

18. Liquid household bleach composition having visual opacity and consisting essentially of an aqueous highly alkaline solution containing about 5% by weight hypochlorite ion and about 1% by weight of a latex of a finely particulate synthetic organic polymer consisting essentially of styrene polymerized in an aqueous mutual solution of acrylic acid or methacrylic acid, an hydroxyalkyl ester of acrylic acid or methacrylic acid, in which the alkyl group contains from 1 to 4 carbon atoms, sodium or potassium vinyl or styrene sulfonate and an anionic surfactant, said polymer containing copolymerized per 100 parts by weight 8 to 12 parts of said acid, 5 to 10 parts of said ester, 0.5 to 5 parts of the sulfonate and the balance styrene.

19. Method of preparing a stable, visually opacified liquid hypochlorite bleach composition by suspension in the bleach of finely particulate styrene-containing polymer which includes forming a latex of a polymer consisting essentially by weight of 65 to 97.5 parts of a styrene monomer, 2 to 34.5 parts of a water soluble α,β ethylenically unsaturated monocarboxylic acid containing from 3 to 4 carbon atoms and from 0.5 to 25 parts of a water soluble vinyl sulfonate having the formula R—CH=CH—SO_3Me in which Me is an alkali metal, R is a hydrocarbon radical free of aliphatic unsaturation and containing up to 10 carbon atoms per 100 parts of the polymer by adding the styrene as a monomer to an aqueous solution of the vinyl acid and vinyl sulfonate containing a noncationic surfactant and reacting at a temperature above 100° F. to copolymerize the styrene, vinyl acid and vinyl sulfonate and adding the resulting latex to the liquid hypochlorite bleach to be opacified in an effective amount between 0.005 and 5 percent by weight, based on the weight of the bleach.

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