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"NON-AQUEOUS LIQUID LAUNDRY DETERGENT"

The present invention relates to non-aqueous liquid laundry detergent compositions. More particularly, the present invention in preferred aspects relates to phosphate free or low phosphate non-aqueous liquid laundry detergent compositions containing a suspension of an alkali metal salt of nitrilotriacetic acid (NTA) and zeolite builders in nonionic surfactants which compositions are easily pourable, are stable against phase separation and gelation and to the use of these compositions for cleaning soiled fabrics.

Liquid non-aqueous heavy duty laundry detergent compositions are well known in the art. For instance, compositions of that type may comprise a liquid nonionic surfactant in which are dispersed particles of a builder, as shown for instance in the U.S. Patents Nos. 4,316,812; 3,630,929; 4,264,466; and British Patents Nos. 1,205,711; 1,270,040 and 1,600,981.

The washing power of synthetic nonionic surfactant detergents in laundry detergent compositions can be increased by the addition of builders. Sodium tripolyphosphate is one of the preferred builders. However, the use of sodium polyphosphate in dry powder detergents does involve several disadvantages such as, for example, the tendency of the polyphosphates to hydrolyse into pyro- and orthophosphates which represent less valuable builders.

In addition the polyphosphate content of laundry detergents has been blamed for the undesirably high phosphate content of surface water. An increased phosphate content in surface water has been found to contribute towards greater algal growth with the result that the biological equilibrium of the water can be adversely altered.

Recently enacted government legislation has been directed to reducing the amount of polyphosphates present in laundry detergents and in some jurisdictions in which polyphosphates have been a problem to require that the laundry detergents not contain any polyphosphate builders.

Liquid detergents are often considered to be more convenient to employ than dry powdered or particulate products and, therefore, have found substantial favour with consumers. They are readily measurable, speedily dissolved in the wash water, capable of being easily applied in concentrated solutions or dispersions to soiled areas on garments to be laundered and are non-dusting, and they usually occupy less storage space. Additionally, the liquid detergents may have incorporated in their formulations materials which could not stand drying operations without deterioration, which materials are often desirably employed in the manufacture of particulate detergent products. Although they are possessed of many advantages over unitary or particulate solid products, liquid detergents often have certain inherent disadvantages too, which have

to be overcome to produce acceptable commercial detergent products. Thus, some such products separate out on storage and others separate out on cooling and are not readily redispersed. In some cases the product viscosity changes and it becomes either too thick to pour or so thin as to appear watery. Some clear products become cloudy and others gel on standing.

In addition to the problem of settling or phase separation the non-aqueous liquid laundry detergents based on liquid nonionic surfactants suffer from the drawback that the nonionics tend to gel when added to cold water. This is a particularly important problem in the ordinary use of European household automatic washing machines where the user places the laundry detergent composition in a dispensing unit (e.g. a dispensing drawer) of the machine. During the operation of the machine the detergent in the dispenser is subjected to a stream of cold water to transfer it to the main body of wash solution. Especially during the winter months when the detergent composition and water fed to the dispenser are particularly cold, the detergent viscosity increases markedly and a gel forms. As a result some of the composition is not flushed completely off the dispenser during operation of the machine, and a deposit of the composition builds up with repeated wash cycles, eventually requiring the user to flush the dispenser with hot water.

The gelling phenomenon can also be a problem

whenever it is desired to carry out washing using cold water as may be recommended for certain synthetic and delicate fabrics of fabrics which can shrink in warm or hot water.

5. The tendency of concentrated detergent compositions to gel during storage is aggravated by storing the compositions in unheated storage areas, or by shipping the compositions during winter months in unheated transportation vehicles.

10. Partial solutions to the gelling problem have been proposed, for example, diluting the liquid nonionic with certain viscosity controlling solvents and gel-inhibiting agents, such as lower alkanols, e.g. ethyl alcohol (see U.S. Patent 3,953,380),
15. alkali metal formates and adipates (see U.S. Patent 4,368,147), hexylene glycol or polyethylene glycol, and nonionic structure modification and optimisation.

- As an example of nonionic surfactant modification one particularly successful result has been achieved
20. by acidifying the hydroxyl moiety end group of the nonionic molecule. The advantages of introducing a carboxylic acid at the end of the nonionic include gel inhibition upon dilution; decreasing the nonionic pour point; and formation of an anionic surfactant
25. when neutralised in the washing liquor. Nonionic structure optimisation has centred on the chain length of the hydrophobic-lipophilic moiety and the number and make-up of alkylene oxide (e.g. ethylene oxide) units of the hydrophilic moiety. For example,
30. it has been found that a C₁₃ fatty alcohol

ethoxylated with 8 moles of ethylene oxide presents only a limited tendency to gel formation.

Nevertheless, improvements are desired in the stability, and gel inhibition of phosphate free or low phosphate non-aqueous liquid fabric treating compositions.

In accordance with a preferred aspect of the present invention a highly concentrated low phosphate, more particularly a polyphosphate detergent builder free, non-aqueous liquid laundry detergent composition is prepared by dispersing a mixture of an alkali metal nitrilotriacetic acid (NTA) and zeolite builders in a liquid nonionic surfactant detergent.

In order to improve the viscosity characteristics of the composition an acid terminated nonionic surfactant can be added. To further improve the viscosity characteristics of the composition and the storage properties of the composition there can be added to the composition viscosity improving and anti-gel agents such as alkylene glycol monoalkyl ethers and anti-settling agents such as phosphoric acid esters and aluminium stearate. In a preferred embodiment of the present invention the detergent composition contains an acid terminated nonionic surfactant and/or an alkylene glycol monoalkyl ether, and an anti-settling agent.

Sanitizing or bleaching agents and activators therefore can be added to improve the bleaching and cleansing characteristics of the composition.

In one embodiment of the invention the builder components of the composition are ground to a

particle size of less than 100 microns and to preferably less than 10 microns to further improve the stability of the suspension of the builder components in the liquid nonionic surfactant detergent.

In addition other ingredients can be added to the composition such as anti-incrustation agents, anti-foam agents, optical brighteners, enzymes, anti-redeposition agents, perfume and dyes.

The presently manufactured washing machines for home use normally operate at washing temperatures of up to 100°C. Up to 18.5 gallons (70 litres) of water are used during the wash and rinse cycles.

About 250 grams of powder detergent per wash is normally used.

In accordance with the present invention where the highly concentrated liquid detergent is used normally only about 100 grams (77 ml) or less of the liquid detergent composition is required to wash a full load of dirty laundry.

Accordingly, in one aspect of the present invention there is provided a phosphate builder-free or substantially phosphate builder-free liquid heavy duty laundry composition comprising a suspension of an alkali metal salt of nitrilotriacetic acid (NTA) and zeolite detergent builders in liquid nonionic surfactant.

This aspect of the invention has the advantage of providing a phosphate free or low phosphate concentrated liquid heavy duty laundry detergent composition which is of

improved stability, of less tendency to settle in storage and of less tendency to gel in storage and in use. The liquid compositions of the present invention are easily pourable, easily measured and easily put into the washing machine.

The polyphosphate builder free detergent compositions according to the preferred aspect overcome the problem of phosphate pollution of surface water.

In a preferred aspect the present invention aims to provide a low polyphosphate, more particularly a polyphosphate free non-polluting liquid heavy duty non-aqueous nonionic detergent composition containing a mixture of an alkali metal salt of nitrilotriacetic acid and zeolite detergent builders suspended in a nonionic surfactant.

This aspect of the invention also aims to provide polyphosphate free or low polyphosphate liquid fabric treating compositions which are suspensions of an alkali metal salt of nitrilotriacetic acid (NTA) and zeolite builders in a non-aqueous liquid and which are storage stable, easily pourable and dispersible in cold, warm or hot water.

This aspect of the invention also aims to formulate polyphosphate free or low polyphosphate highly built heavy duty non-aqueous liquid nonionic surfactant laundry detergent compositions which can be poured at a wide range of temperatures and which can be repeatedly dispersed from the dispensing unit of European style automatic laundry washing machines with less tendency to fouling or plugging of the dispenser even during the winter months.

This aspect of the invention further aims to provide polyphosphate free or low polyphosphate suspensions of heavy duty built non-aqueous liquid nonionic laundry detergent composition of less tendency to gel and of improved stability which include an effective amount of nitrilotriacetic acid (NTA) and zeolite builders.

The invention also aims to provide suspensions of heavy duty built non-aqueous liquid nonionic laundry detergent composition of less tendency to gel and of improved stability which include an amount of phosphoric acid alkanol ester and/or aluminium fatty acid salt anti-settling agent which is sufficient to further increase the stability of the composition, i.e. prevent settling of builder particles, etc.,

preferably while reducing or at least without increasing the plastic viscosity of the composition.

- According to a preferred form of the present invention there is prepared a low polyphosphate or
5. polyphosphate free detergent builder composition by adding to the non-aqueous liquid nonionic surfactant an effective amount of a mixture of an alkali metal nitrilotriacetic acid (NTA) and zeolite builders and inorganic or organic fabric treating additives, e.g.
 10. viscosity improving and anti-gel agents, anti-settling agents, anti-incrustation agents, bleaching agents, bleach activators, anti-foam agents, optical brighteners, enzymes, anti-redeposition agents, perfume and dyes.
 15. The nonionic synthetic organic detergents employed in the practice of the present invention may be any of a wide variety of such compounds, which are well known.
 20. As is well known, the nonionic synthetic organic detergents are characterised by the presence of an organic hydrophobic group and an organic hydrophilic group and are typically produced by the condensation of an organic aliphatic or alkyl aromatic hydrophobic compound with ethylene oxide (hydrophilic in nature).
 25. Practically any hydrophobic compound having a carboxy, hydroxy, amido or amino group with a free

hydrogen attached to the nitrogen can be condensed with ethylene oxide or with the polyhydration product thereof, polyethylene glycol, to form a nonionic detergent. The length of the hydrophilic or polyoxy ethylene chain can be readily adjusted to achieve the desired balance between the hydrophobic and hydrophilic groups. Typical suitable nonionic surfactants are those disclosed in U.S. Patents 4,316,812 and 3,630,929.

5. 10. Usually, the nonionic detergents are poly-lower alkoxyated lipophiles wherein the desired hydrophile-lipophile balance is obtained by addition of a hydrophilic poly-lower alkoxy group to a lipophilic moiety. A preferred class of the nonionic detergent employed is the poly-lower alkoxyated higher alkanol wherein the alkanol is of 9 to 18 carbon atoms and wherein the number of mols of lower alkylene oxide (of 2 or 3 carbon atoms) is from 3 to 12. Of such materials it is preferred to employ those wherein the higher alkanol is a higher fatty alcohol of 9 to 11 or 12 to 15 carbon atoms and which contain from 5 to 8 or 5 to 9 lower alkoxy groups per mol. Preferably, the lower alkoxy is ethoxy but in some instances, it may be desirably mixed with propoxy, the latter, if present, usually being a minor (less than 50%) proportion.
15. 20. 25.

Exemplary of such compounds are those wherein the alkanol is of 12 to 15 carbon atoms and which contain about 7 ethylene oxide groups per mole, e.g. Neodol (Registered Trade Mark) 25-7 and Neodol 23-6.5,

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- which products are made by Shell Chemical Company, Inc. The former is a condensation product of a mixture of higher fatty alcohols averaging about 12 to 15 carbon atoms, with about 7 moles of ethylene oxide and the latter is a corresponding mixture wherein the carbon atom content of the higher fatty alcohol is 12 to 13 and the number of ethylene oxide groups present averages about 6.5. The higher alcohols are primary alkanols. Other examples of such detergents include Tergitol (Registered Trade Mark) 15-S-7 and Tergitol 15-S-9, both of which are linear secondary alcohol ethoxylates made by Union Carbide Corp. The former is a mixed ethoxylation product of 11 to 15 carbon atoms linear secondary alkanol with seven moles of ethylene oxide and the latter is a similar product but with nine moles of ethylene oxide being reacted.

- Also useful in the compositions of the present invention as a component of the nonionic detergent are higher molecular weight nonionics, such as Neodol 45-11, which are similar ethylene oxide condensation products of higher fatty alcohols, with the higher fatty alcohol being of 14 to 15 carbon atoms and the number of ethylene oxide groups per mol being about 11. Such products are also made by Shell Chemical Company.

- Other useful nonionics are represented by the commercially well known class of nonionics sold under the trademark Plurafac (Registered Trade Mark). The Plurafacs are the reaction product of a higher linear

- alcohol and a mixture of ethylene and propylene oxides, containing a mixed chain of ethylene oxide and propylene oxide, terminated by a hydroxyl group. Examples include Product A (a C₁₃-C₁₅ fatty alcohol condensed with 6 moles ethylene oxide and 3 moles propylene oxide), Product B (a C₁₃-C₁₅ fatty alcohol condensed with 7 moles propylene oxide and 4 moles ethylene oxide), and Product C (a C₁₃-C₁₅ fatty alcohol condensed with 5 moles propylene oxide and 10 moles ethylene oxide).

- Another group of liquid nonionics are commercially available from Shell Chemical Company, Inc. under the Dobanol trade mark: Dobanol 91-5 is an ethoxylated C₉-C₁₁ fatty alcohol with an average of 5 moles ethylene oxide; and Dobanol 25-7 is an ethoxylated C₁₂-C₁₅ fatty alcohol with an average of 7 moles ethylene oxide.

- In the preferred poly-lower alkoxyated higher alkanols, to obtain the best balance of hydrophilic and lipophilic moieties the number of lower alkoxies will usually be from 40% to 100% of the number of carbon atoms in the higher alcohol, preferably 40 to 60% thereof and the nonionic detergent will preferably contain at least 50% of such preferred poly-lower alkoxy higher alkanol. Higher molecular weight alkanols and various other normally solid nonionic detergents and surface active agents may be contributory to gelation of the liquid detergent and consequently, will preferably be omitted or limited in quantity in the compositions of the present

- invention, although minor proportions thereof may be employed for their cleaning properties. With respect to both preferred and less preferred nonionic detergents the alkyl groups present therein are generally
5. linear although branching may be tolerated, such as at a carbon next to or two carbons removed from the terminal carbon of the straight chain and away from the ethoxy chain, if such branched alkyl is not more than three carbons in length. Normally, the proportion of carbon atoms in such a branched configuration
10. will be minor rarely exceeding 20% of the total carbon atom content of the alkyl group. Similarly, although linear alkyls which are terminally joined to the ethylene oxide chains are highly preferred and
15. are considered to result in the best combination of detergency, biodegradability and non-gelling characteristics, medial or secondary joinder to the ethylene oxide in the chain may occur. It is usually in only a minor proportion of such alkyls, generally
20. less than 20% but, as is in the case of the mentioned Tergitols, may be greater. Also, when propylene oxide is present in the lower alkylene oxide chain, it will usually be less than 20% thereof and preferably less than 10% thereof.
25. When greater proportions of non-terminally alkoxyated alkanols, propylene oxide-containing poly-lower alkoxyated alkanols and less hydrophile-lipophile balanced nonionic detergents than mentioned above are employed and when other nonionic detergents
30. are used instead of the preferred nonionics recited

- herein, the product resulting may not have as good detergency, stability, viscosity and non-gelling properties as the preferred compositions but use of the viscosity and gel controlling compounds of the present invention can also improve the properties of the detergents based on such nonionics. In some cases, as when a higher molecular weight poly-lower alkoxyated higher alkanol is employed, often for its detergency, the proportion thereof will be regulated or limited as in accordance with the results of routine experiments, to obtain the desired detergency and still have the product non-gelling and of desired viscosity. Also, it has been found that it is only rarely necessary to utilise the higher molecular weight nonionics for their detergent properties since the preferred nonionics described herein are excellent detergents and additionally, permit the attainment of the desired viscosity in the liquid detergent without gelation at low temperatures.
- Another useful group of nonionic surfactants are the "Surfactant T" series of nonionics available from British Petroleum. The Surfactant T nonionics are obtained by the ethoxylation of secondary C₁₃ fatty alcohols having a narrow ethylene oxide distribution. The Surfactant T5 has an average of 5 moles of ethylene oxide; Surfactant T7 an average of 7 moles of ethylene oxide; Surfactant T9 an average of 9 moles of ethylene oxide and Surfactant T12 an average of 12 moles of ethylene oxide per mole of secondary C₁₃ fatty alcohol.

- In the compositions of the present invention, preferred nonionic surfactants include the C₁₃-C₁₅ secondary fatty alcohols with relatively narrow contents of ethylene oxide in the range of from about 7 to 9 moles, and the C₉ to C₁₁ fatty alcohols ethoxylated with about 5-6 moles ethylene oxide.
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Mixtures of two or more of the liquid nonionic surfactants can be used and in some cases advantages can be obtained by the use of such mixtures.

10. The viscosity and gel properties of the liquid detergent compositions can be improved by including in the composition an effective amount of an acid terminated liquid nonionic surfactant. The acid terminated nonionic surfactants consist of a nonionic surfactant which has been modified to convert a free hydroxyl group thereof to a moiety having a free carboxyl group, such as an ester or a partial ester of a nonionic surfactant and a polycarboxylic acid or anhydride.
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20. As disclosed in the commonly assigned copending application U.S. Serial No. 597,948 filed 9th April, 1984, corresponding to G.B. Application No. 85.09084 Serial No. 2158454A, the disclosure of which is incorporated herein by reference, the free carboxyl group modified nonionic surfactants, which may be broadly characterised as polyether carboxylic acids, function to lower the temperature at which the liquid nonionic forms a gel with water.
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- The addition of the acid terminated nonionic surfactants to the liquid nonionic surfactant aids in
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the dispensibility of the composition, i.e. pourability, and lowers the temperature at which the liquid nonionic surfactants form a gel in water without a decrease in their stability against settling. The acid terminated nonionic surfactant reacts in the washing machine water with the alkalinity of the dispersed builder salt phase of the detergent compositions and acts as an effective anionic surfactant.

- 3 10. Specific examples include the half-esters of Plurafac RA30 with succinic anhydride, the ester or half ester of Dobanol 25-7 with succinic anhydride, and the ester or half ester of Dobanol 91-5 with succinic anhydride. Instead of succinic anhydride, 15. other polycarboxylic acids or anhydrides can be used, e.g. maleic acid, maleic acid anhydride, citric acid and the like.

The acid terminated nonionic surfactants can be prepared as follows:

20. Acid Terminated Product A. 400g of Product A nonionic surfactant which is a C₁₃ to C₁₅ alkanol which has been alkoxyated to introduce 6 ethylene oxide and 3 propylene oxide units per alkanol unit is mixed with 32g of succinic anhydride and heated for 7 25. hours at 100°C. The mixture is cooled and filtered to remove unreacted succinic material. Infrared analysis indicated that about one half of the nonionic surfactant has been converted to the acidic half-ester thereof.
30. Acid Terminated Dobanol 25-7. 522g of Dobanol

- 25-7 nonionic surfactant which is the product of ethoxylation of a C₁₂ to C₁₅ alkanol and has about 7 ethylene oxide units per molecule of alkanol is mixed with 100g of succinic anhydride and 0.1g of pyridine (which acts as an esterification catalyst) and heated at 260°C for 2 hours, cooled and filtered to remove unreacted succinic material. Infrared analysis indicates that substantially all the free hydroxyls of the surfactant have reacted.
5. Acid Terminated Dobanol 91-5. 1000g of Dobanol 91-5 nonionic surfactant which is the product of ethoxylation of a C₉ to C₁₁ alkanol and has about 5 ethylene oxide units per molecule of alkanol is mixed with 265g of succinic anhydride and 0.1g of pyridine catalyst and heated at 260°C for 2 hours, cooled and filtered to remove unreacted succinic material. Infrared analysis indicated that substantially all the free hydroxyls of the surfactant have reacted.
10. Other esterification catalysts, such as an alkali metal alkoxide (e.g. sodium methoxide) may be used in place of, or in admixture with, the pyridine.
15. The acidic polyether compound, i.e. the acid terminated nonionic surfactant is preferably added dissolved in the nonionic surfactant.
20. The liquid non-aqueous nonionic surfactant used in the compositions of the present invention has dispersed and suspended therein fine particles of organic and/or inorganic detergent builder salts.
25. The present invention includes as an essential part of the composition a mixture of organic and
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inorganic builder salts.

The preferred organic builder salts comprise alkali metal salts of nitrilotriacetic acid, preferably the sodium and potassium alkali metal salts, the more preferred white sodium nitrilotriacetic acid salt.

Other organic builders that can be used are polymers and copolymers of polyacrylic acid and polymaleic anhydride and the alkali metal salts thereof. More specifically such builder salts can consist of a copolymer which is the reaction product of about equal moles of methacrylic acid and maleic anhydride which has been completely neutralized to form the sodium salt thereof. The builder is commercially available under the tradename of Sokalan (Registered Trade Mark) CP5. This builder serves when used even in small amounts to inhibit encrustation, i.e. as an antiencrustation agent.

Since the compositions of the present invention are generally highly concentrated, and, therefore, may be used at relatively low dosages, it is desirable to supplement the builder with an auxiliary builder such as an alkali metal lower polycarboxylic acid having high calcium and magnesium binding capacity to inhibit incrustation which could otherwise be caused by formation of insoluble calcium and magnesium salts. Suitable alkali metal polycarboxylic acids are alkali metal salts of citric and tartaric acid, e.g. monosodium citrate (anhydrous), trisodium citrate, glutaric acid salt,

gluconic acid salt and diacid salt with longer chain.

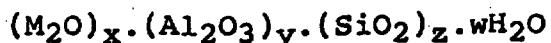
- Examples of organic alkaline sequestrant builder salts which can be used with the nitrilotriacetic acid (NTA) or in admixture with other organic and inorganic builders are alkali metal, ammonium or substituted ammonium, aminopolycarboxylate, e.g. sodium and potassium ethylene diamine-tetraacetate (EDTA) and triethanolammonium N-(2-hydroxy-ethyl)nitrilodiacetates. Mixed salts of these aminopolycarboxylates are also suitable.

Other suitable builders of the organic type include carboxymethylsuccinates, tartronates and glycolates.

- Of special value are the polyacetal carboxylates. The polyacetal carboxylates and their use in detergent compositions are described in 4,144,226, 4,315,092 and 4,146,495. Other patents on similar builders include 4,141,676, 4,169,934, 4,201,858, 4,204,852, 4,224,420, 4,225,685, 4,226,960, 4,233,422, 4,233,423, 4,302,564 and 4,303,777. The preferred inorganic builder salts comprises the zeolites.

The water-insoluble crystalline and amorphous aluminosilicate zeolites can be used.

- The zeolites generally have the formula:



- wherein x is 1, y is from 0.8 to 1.2 and preferably 1, z is from 1.5 to 3.5 or higher and preferably 2 to

- 3 and w is from 0 to 9, preferably 2.5 to 6 and M is preferably sodium. A typical zeolite is type A or similar structure, with type 4A particularly preferred. The preferred aluminosilicates have
5. calcium ion exchange capacities of about 200 milliequivalents per gram or greater, e.g. 400 meq/g.

- Various crystalline zeolites (i.e. aluminosilicates) which can be used are described in British Patent 1,504,168, U.S. Patent 4,409,136 and Canadian
10. Patents 1,072,835 and 1,087,477, all of which are hereby incorporated by reference for such descriptions. An example of amorphous zeolites useful herein can be found in Belgian Patent 835,351 and this patent, too, is incorporated herein by reference.
15. These builders are particularly compatible with the aluminium tristearate stabilizing agent.

- The detergent compositions of the present invention also include inorganic water soluble and/or water insoluble detergent builder salts. Suitable
20. inorganic alkaline builder salts which can be used are alkali metal carbonates, borates, bicarbonates and silicates. (Ammonium or substituted ammonium salts can also be used.) Specific examples of such salts are sodium carbonate, sodium tetraborate,
25. sodium bicarbonate, sodium sesquicarbonate, and potassium bicarbonate.

- The alkali metal silicates are useful builder salts which also function to make the composition anticorrosive to washing machine parts. Sodium
30. silicates of $\text{Na}_2\text{O}/\text{SiO}_2$ ratios of from 1.6/1 to 1/3.2

especially about 1/2 to 1/2.8 are preferred.

Potassium silicates of the same ratios can also be used.

Though it is preferred that the detergent composition be phosphate or polyphosphate free or substantially polyphosphate free, such amounts of the conventional polyphosphate builder salts can be added as the local legislation permits. Specific examples of such builder salts are sodium tripolyphosphate (TPP), sodium pyrophosphate, potassium pyrophosphate, potassium tripolyphosphate and sodium hexametaphosphate. The sodium tripolyphosphate (TPP) is a preferred polyphosphate. In the formulations where the polyphosphate is added it is added in an amount of 0 to 50%, such as 0 to 30% and 5 to 15. As mentioned previously, however, it is preferred that the formulations be polyphosphate free or substantially polyphosphate free.

Other typical suitable builders include, for example, those disclosed in U.S. Patents 4,316,812; 4,264,466 and 3,630,929. The inorganic alkaline builder salts can be used with the nonionic surfactant detergent compound or in admixture with other organic or inorganic builder salts.

Other materials such as clays, particularly of the water insoluble types, may be useful adjuncts in compositions of the present invention. Particularly useful is bentonite. This material is primarily montmorillonite which is a hydrated aluminium

- silicate in which about 1/6th of the aluminium atoms maybe replaced by magnesium atoms and with which varying amounts of hydrogen, sodium, potassium and calcium, may be loosely combined. The bentonite in
5. its more purified form (i.e. free from any grit, sand or the like) suitable for detergents invariably contains at least 50% montmorillonite and thus its cation exchange capacity is at least about 50 to 75 meq. per 100g of bentonite. Particularly preferred
 10. bentonites are the Wyoming or Western U.S. bentonites which have been sold as Thixojels 1, 2, 3 and 4 by Georgia Kaolin Co. These bentonites are known to soften textiles as described in British Patent 401,413 to Marriott and British Patent 461,221 to
 15. Marriott and Dugan.

The inclusion in the detergent composition of an effective amount of low molecular weight amphiphilic compounds which function as viscosity control and gel-inhibiting agents for the nonionic surfactant substantially improves the storage properties of the

20. composition.

- The amphiphilic compounds can be considered to be analogous in chemical structure to the ethoxylated and/or propoxylated fatty alcohol nonionic
25. surfactants but have relatively short hydrocarbon chain lengths (C_2-C_8) and a low content of ethylene oxide (about 2 to 6 ethylene oxide groups per molecule).

Suitable amphiphilic compounds can be represented

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by the following general formula:



5. where R represents a C₂-C₈ alkyl group, and n is a number of from about 1 to 6, on average.

Specifically the compounds are preferably low (C₂ to C₃) alkylene glycol mono lower (C₂ to C₅) alkyl ethers.

10. More specifically the compounds are preferably mono di- or tri-lower (C₂ to C₃) alkylene glycol mono-lower (C₁ to C₅) alkyl ethers.

Specific examples of suitable amphiphilic compounds include ethylene glycol monoethyl ether

15. (C₂H₅-O-CH₂CH₂OH), diethylene glycol monobutyl ether (C₄H₉-O-(CH₂CH₂O)₂H), tetraethylene glycol monobutyl ether (C₄H₉-O-(CH₂CH₂O)₄H), and dipropylene glycol monomethyl ether CH₃-O-(CH₂CHO)₂H.

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Diethylene glycol monoethyl ether is especially preferred.

The inclusion in the composition of the low molecular weight lower alkylene glycol mono alkyl ether

25. decreases the viscosity of the composition, such that it is more easily pourable, improves the stability against settling and improves the dispersibility of the composition on addition to warm water or cold water.

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The compositions of the present invention have improved viscosity and stability characteristics and remain stable and pourable at temperatures as low as about 5°C.

5. The physical stability of the suspension of the detergent builder compound or compounds and any other suspended additive, such as bleaching agent, etc., in the liquid vehicle in accordance with the present invention may be improved by the presence of a
10. stabilising agent which is an aluminium salt of a higher fatty acid or an alkanol ester of phosphoric acid.

- Improvements in the stability and anti-settling properties of the composition may be achieved by the
15. addition of a small effective amount of an aluminium salt of a higher fatty acid to the composition.

- The aluminium salt stabilizing agents are the subject matter of the commonly assigned copending application U.S. Serial No. 725,455, filed 22nd
20. April, 1985, corresponding to G.B. Application No. 86.04969 Serial No. 2172897A, the disclosure of which is incorporated herein by reference.

- The preferred higher aliphatic fatty acids will have from about 8 to about 22 carbon atoms, more
25. preferably from about 10 to 20 carbon atoms, and especially preferably from about 12 to 18 carbon atoms. The aliphatic radical may be saturated or unsaturated and may be straight or branched. As in the case of the nonionic surfactants, mixtures of
30. fatty acids may also be used, such as those derived

from natural sources, such as tallow fatty acid, and coco fatty acid.

Examples of the fatty acids from which the aluminium salt stabilisers can be formed include,

5. decanoic acid, dodecanoic acid, palmitic acid, myristic acid, stearic acid, oleic acid, eicosanoic acid, tallow fatty acid, coco fatty acid and mixtures of these acids. The aluminium salts of these acids are generally commercially available, and are preferably used in the triacid form, e.g. aluminium stearate as aluminium tristearate $\text{Al}(\text{C}_{17}\text{H}_{35}\text{COO})_3$. The monoacid salts, e.g. aluminium monostearate $\text{Al}(\text{OH})_2(\text{C}_{17}\text{H}_{35}\text{COO})$ and diacid salts, e.g. aluminium distearate, $\text{Al}(\text{OH})(\text{C}_{17}\text{H}_{35}\text{COO})_2$, and mixtures of two
10. or three of the mono-, di- and triacid aluminium salts can also be used. It is most preferred, however, that the triacid aluminium salts comprises at least 30%, preferably at least 50%, especially preferably at least 80% of the total amount of
15. aluminium fatty acid salt.

- The aluminium salts, as mentioned above, are commercially available and can be easily produced by, for example, saponifying a fatty acid, e.g. animal fat, stearic acid, etc., followed by treatment of the
20. resulting soap with alum, alumina, etc.

- Although the applicants do not wish to be bound by any particular theory of the manner by which the aluminium salt functions to prevent settling of the suspended particles, it is presumed that the
25. aluminium salt increases the wettability of the solid

surfaces by the nonionic surfactant. This increase in wettability, therefore, allows the suspended particles to more easily remain in suspension.

5. Only very small amounts of the aluminium salt stabilising agent are required to obtain the significant improvement in physical stability.

10. In addition to its action as a physical stabilising agent, the aluminium salt has the additional advantages over other physical stabilising agents that it is nonionic in character and is compatible with the nonionic surfactant component and does not interfere with the overall detergency of the composition; it exhibits some anti-foaming effect; it can function to boost the activity of fabric
15. softeners, and it confers a longer relaxation time to the suspensions.

20. Improvements in stability of the composition may be achieved in certain formulations by incorporation of a small effective amount of an acidic organic phosphorous compound having an acidic - POH group, such as a partial ester of phosphorous acid and an alkanol.

25. As disclosed in the commonly assigned co-pending U.S. Application Serial No. 597,793 filed 6th April, 1984, corresponding to British Patent Application No. 85.09083, Serial No. 2158453A, the disclosure of which is incorporated herein by reference, the acidic organic phosphorus compound having an acidic - POH group can increase the stability of the suspension of
30. builders in the non-aqueous liquid nonionic surfactant.

The acidic organic phosphorus compound may be, for instance, a partial ester of phosphoric acid and an alcohol such as an alkanol which has a lipophilic character having, for instance, more than 5 carbon atoms, e.g. 8 to 20 carbon atoms.

A specific example is a partial ester of phosphoric acid and a C₁₆ to C₁₈ alkanol (Empiphos (Registered Trade Mark) 5632 from Marchon); it is made up of about 35% monoester and 65% diester.

The inclusion of quite small amounts of the acidic organic phosphorus compound makes the suspension significantly more stable against settling on standing but remains pourable, while for the low concentration of stabiliser, e.g. below about 1%, its plastic viscosity will generally decrease.

The bleaching agents are classified broadly, for convenience, as chlorine bleaches and oxygen bleaches. Chlorine bleaches are typified by sodium hypochlorite (NaOCl), potassium dichloroisocyanurate (59% available chlorine), and trichloroisocyanuric acid (95% available chlorine). Oxygen bleaches are preferred and are represented by percompounds which liberate hydrogen peroxide in solution. Preferred examples include sodium and potassium perborates, percarbonates and perphosphates, and potassium monopersulphate. The perborates, particularly sodium perborate monohydrate are especially preferred.

The peroxygen compound is preferably used in admixture with an activator therefor. Suitable activators which can lower the effective operating

temperature of the peroxide bleaching agent are disclosed in U.S. Patent 4,264,466 or in column 1 of U.S. Patent 4,430,244, the relevant disclosures of which are incorporated herein by reference. Poly-

5. acylated compounds are preferred activators; among these, compounds such as tetraacetyl ethylene diamine ("TAED") and pentaacetyl glucose are particularly preferred.

Other useful activators include, for example,

10. acetylsalicylic acid derivatives, ethylidene benzoate acetate and its salts, ethylidene carboxylate acetate and its salts, alkyl and alkenyl succinic anhydride, tetraacetylglycouril ("TAGU"), and the derivatives of these. Other useful classes of activators are
15. disclosed, for example, in U.S. Patents 4,111,826; 4,422,950 and 3,661,789.

The bleach activator usually interacts with the peroxygen compound to form a peroxyacid bleaching agent in the wash water. It is preferred to include

20. a sequestering agent of high complexing power to inhibit any undesired reaction between such peroxyacid and hydrogen peroxide in the wash solution in the presence of metal ions. Suitable sequestering agents include, for example, sodium salts of ethylene
25. diamine tetraacetic acid (EDTA), diethylene triamine pentaacetic acid (DETPA); diethylene triamine pentamethylene phosphonic acid (DTPMP); and ethylene diamine tetramethylene phosphonic acid (EDITEMPA).
The sequestering agents can be used alone or in
30. admixture.

In order to avoid loss of peroxide bleaching agent, e.g. sodium perborate, resulting from enzyme-induced decomposition, such as by catalase enzyme, the compositions may additionally include an enzyme inhibitor compound, i.e. a compound capable of inhibiting enzyme-induced decomposition of the peroxide bleaching agent. Suitable inhibitor compounds are disclosed in U.S. Patent 3,606,990, the relevant disclosure of which is incorporated herein by reference.

Of special interest as the inhibitor compound, mention can be made of hydroxylamine sulphate and other water-soluble hydroxylamine salts. In the preferred non-aqueous compositions of the present invention, suitable amounts of the hydroxylamine salt inhibitors can be as low as about 0.01 to 0.4%. Generally, however, suitable amounts of enzyme inhibitors are up to about 15%, for example, 0.1 to 10%, by weight of the composition.

In addition to the detergent builders, various other detergent additives or adjuvants may be present in the detergent product to give it additional desired properties, either of functional or aesthetic nature. Thus, there may be included in the formulation, minor amounts of soil suspending or anti-redeposition agents, e.g. polyvinyl alcohol, fatty amides, sodium carboxymethyl cellulose, hydroxypropyl methyl cellulose. A preferred anti-redeposition agent is sodium carboxymethyl cellulose having a 2:1 ratio of CM/MC which is sold under the trade name Relatin DM 4050.

Optical brighteners for cotton, polyamide and polyester fabrics can be used. Suitable optical brighteners include stilbene, triazole and benzidine sulphone compositions, especially sulphonated substituted triazinyl stilbene, sulphonated naphthotriazole stilbene or benzidine sulphone, most preferred are stilbene and triazole combinations. Preferred brighteners are stilbene Brightener N4 which is a dimorpholino dianilino stilbene sulphonate.

Enzymes, preferably proteolytic enzymes, such as subtilisin, bromelin, papain, trypsin and pepsin, as well as amylase type enzymes, lipase type enzymes, and mixtures thereof can be used. Preferred enzymes include protease slurry, esperase slurry and amylase. A preferred enzyme is Esperase (Registered Trade Mark) SL8 which is a protease. Anti-foam agents, e.g. silicon compounds, such as Silicane L 7604 can also be added in small effective amounts.

Bactericides, e.g. tetrachlorosalicylanilide and hexachlorophene; fungicides; dyes; pigments (water dispersible); preservatives; ultraviolet absorbers; anti-yellowing agents, such as sodium carboxymethyl cellulose; pH modifiers and pH buffers; colour safe bleaches, perfume and dyes and blueing agents such as ultramarine blue can be used.

The composition may also contain an inorganic insoluble thickening agent or dispersant of very high surface area such as finely divided silica of extremely fine particle size (e.g. of 5-100 millimicrons diameters such as sold under the name Aerosil

(Registered Trade Mark)) or the other highly voluminous inorganic carrier materials disclosed in U.S.

Patent 3,630,929, in proportions of 0.1-10%, e.g. 1 to 5%. It is preferable, however, that compositions

5. which form peroxyacids in the wash bath (e.g. compositions containing peroxygen compound and activator therefor) be substantially free of such compounds and of other silicates; it has been found, for instance, that silica and silicates promote the undesired
10. decomposition of the peroxyacid.

The stability of the builder salts in the composition during storage and the dispersibility of the composition in water may be improved by grinding and reducing the particle size of the solid builders

15. to less than 100 microns, preferably less than 40 microns and more preferably to less than 10 microns. The solid builders are generally supplied in particle sizes of about 100, 200 or 400 microns. The nonionic liquid surfactant phase can be mixed with the solid
20. builders prior to or after carrying out the grinding operation.

In a preferred form of the invention, the mixture of liquid nonionic surfactant and solid ingredients is subjected to an attrition type of mill

25. in which the particle sizes of the solid ingredients are reduced to less than about 10 microns, e.g. to an average particle size of 2 to 10 microns or even lower (e.g. 1 micron). Preferably less than about 10%, especially less than about 5% of all the

30. suspended particles have particle sizes greater than

- 10 microns. Compositions whose dispersed particles are of such small size have improved stability against separation or settling on storage. Addition of the acid terminated nonionic surfactant compound
5. aids in the dispersibility of the dispersions without a corresponding decrease in the dispersions stability against settling.

- In the grinding operation, it is preferred that the proportion of solid ingredients be high enough
10. (e.g. at least about 40% such as about 50%) that the solid particles are in contact with each other and are not substantially shielded from one another by the nonionic surfactant liquids. After the grinding step any remaining liquid nonionic surfactant can be
15. added to the ground formulation. Mills which employ grinding balls (ball mills) or similar mobile grinding elements have given very good results. Thus, one may use a laboratory batch attritor having 8 mm diameter steatite grinding balls. For larger
20. scale work a continuously operating mill in which there are 1 mm or 1.5 mm diameter grinding balls working in a very small gap between a stator and a rotor operating at a relatively high speed (e.g. a CoBall mill) may be employed; when using such a mill,
25. it is desirable to pass the blend of nonionic surfactant and solids first through a mill which does not effect such fine grinding (e.g. a colloid mill) to reduce the particle size to less than 100 microns (e.g. to about 40 microns) prior to the step of
30. grinding to an average particle diameter below about 10 microns in the continuous ball mill.

For heavy duty liquid detergent compositions of the present invention, typical proportions (based on the total composition, unless otherwise specified) of the ingredients are as follows:

Liquid nonionic surfactant detergent in the range of about 20 to 60, such as 25 to 45 percent;

Acid terminated nonionic surfactant may be omitted, it is preferred however that it be added to the composition in an amount in the range of about 2 to 20, such as 3 to 15 percent;

Alkali metal salt of nitrilotriacetic acid builder in the range of about 5 to 50, such as 10 to 20 percent;

Zeolite builder in the range of about 10 to 45, such as 10 to 25 percent;

Phosphate e.g. polyphosphate detergent builder salt in the range of about 0 to 50%, such as 0 to 30% preferably 5 to 15%;

Copolymer of polyacrylate and polymaleic anhydride alkali metal salt anti incrustation agent in the range of about 0 to 10, such as 2 to 8 percent;

Alkylene glycol monoalkylether anti-gelling agent may be omitted, it is preferred however that it be added to the composition in an amount in the range of about 5 to 20, such as 5 to 15 percent;

Aluminium salt of fatty acid stabilizing agent in the range of about 0 to 3.0 or 0.25 to 3.0, such as 0.5 to 2.0 percent;

Phosphoric acid alkanol ester stabilizing agent

in the range of 0 to 2.0, such as 0.10 to 1.0 percent;

It is preferred that at least one of the aluminium salt or phosphoric acid ester stabilizing agents be included in the composition;

5. Bleaching agent in the range of about 0 to 15, such as 5 to 15 percent;

Sequestering agent for bleach in the range of about 0 to 3.0, preferably 0.5 to 2.0 percent;

10. Anti-redeposition agent in the range of about 0 to 3.0, preferably 0.5 to 2.0 percent;

Optical brightener in the range of about 0 to 2.0, preferably 0.25 to 1.0 percent;

Enzymes in the range of about 0 to 3.0, preferably 0.5 to 2.0 percent;

15. Perfume in the range of about 0 to 3.0, preferably 0.25 to 1.25 percent;

Dye in the range of about 0 to 0.10, preferably 0.0025 to 0.050.

20. Various of the previously mentioned additives can optionally be added to achieve the desired function of the added materials.

25. Mixtures of the acid terminated nonionic surfactant and the alkylene glycol alkyl ether anti-gel agents can be used and in some cases advantages can be obtained by the use of such mixtures alone, or with the addition to the mixture of a stabilizing and anti-settling agent.

30. In the selection of the additives, they will be chosen to be compatible with the main constituents of

the detergent composition. In this application, as mentioned above, all proportions and percentages are by weight of the entire formulation or composition unless otherwise indicated.

The concentrated non-aqueous nonionic liquid detergent composition of the present invention dispenses readily in the water in the washing machine. The presently used home washing machines normally use about 250 grams of powder detergent to wash a full load of laundry. In accordance with the present invention only about 77 ml or about 100 grams of the concentrated liquid nonionic detergent composition is needed.

The detergent composition of a typical formulation in accordance with the invention is formulated using the below named ingredients:

	<u>Weight %</u>
Nonionic surfactant detergent.	30-40
Acid terminated surfactant	4-10
Alkali metal salt of nitrilotriacetic acid builder (NTA)	5-15
Zeolite builder	15-20
Copolymer of polyacrylate and polymaleic anhydride alkali metal salt anti-encrustation agent (Sokalan CP-5)	3-5
Polyphosphate builder salt	0-30
Alkylene glycol monoalkylether anti-gel agent	8-12
Aluminium salt of fatty acid stabilizing agent	0.75-1.25

Alkali metal perborate bleaching agent	8-12
Bleach activator (TAED)	3.5-5.5
Sequestering agent (Dequest (Registered Trade Mark) 2066)	0.75-1.25
Anti-redeposition agent (Relatin DM (4050)	0.75-1.25
Optical brightener (Stilbene Brightener N4)	0.25-0.75
Enzymes (Protease-Esperease SL8)	0.75-1.25
Perfume	0.75-1.0
Dye	0.0025-0.0100

The invention may be put into practice in various ways and one specific embodiment will be described to illustrate the invention with reference to the accompanying example.

EXAMPLE

A concentrated nonaqueous liquid nonionic surfactant detergent composition is formulated from the following ingredients in the amounts specified in Table 1 below.

TABLE 1

<u>Ingredients</u>	<u>Weight %</u>
A mixture of C ₁₃ -C ₁₅ fatty alcohol condensed with 7 moles of propylene oxide and 4 moles ethylene oxide and C ₁₃ -C ₁₅ fatty alcohol condensed with 5 moles propylene oxide and 10 moles ethylene oxide.	13.5
Surfactant T7 nonionic surfactant	10.0
Surfactant T9 nonionic surfactant	10.0
Acid terminated Dobanol 91-5 reaction product with succinic anhydride (made as described above)	5.0

TABLE 1 (continued)

	<u>Ingredients</u>	<u>Weight %</u>
	Sodium salt of nitrilotriacetic acid (NTA) builder	10.3
5.	Zeolite builder	18.6
	Copolymer of polyacrylate and polymaleic anhydride sodium salt anti-incrustation agent (Sokolan CP5)	4.0
	Diethylene glycol monobutylether anti-gel agent	10.0
10.	Aluminium tri-stearate stabilizing agent	1.0
	Sodium perborate monohydrate bleaching agent	9.0
	Tetraacetylene diamine (TAED) bleach activator	4.5
15.	Diethylenetriamine pentamethylene phosphoric acid sodium salt (Dequest 2066) sequestering agent	1.0
	Relatin DM (4050) CMC/MC 2:1 blend	
20.	anti-redeposition agent	1.0
	Stilbene brightener N4	0.5
	Protease (Esperase SL8)	1.0
	Perfume	0.5925
	Dye	<u>0.0075</u>
25.		100.000

The formulation is ground for about one hour to reduce the particle size of the suspended builder salts to less than 40 microns. The formulated detergent composition is found to be stable and non-gelling in storage and to have a high detergent capacity.

The formulations can be prepared without grinding the builder salts and suspended solid particles to a small particle size, but best results are obtained by grinding the formulation to reduce

5. the particle size of the suspended solid particles.

The builder salts can be used as provided, e.g. zeolites can be obtained in particle sizes of 5 to 10 microns, or the builder salts and suspended solid particles can be ground or partially ground prior to

10. mixing them with nonionic surfactant. The grinding can be carried out in part prior to mixing and grinding completed after mixing or the entire grinding operation can be carried out after mixing with the liquid surfactant. The formulations

15. containing suspended builder and solid particles less than 40 microns in size are preferred.

Reference has been made to USP 3606990 for inhibitors of enzyme induced decomposition of bleaching agents, and reference made to the use of

20. hydroxylamine sulphate for such purpose.

USP 3606990 also lists hydroxylamine hydrochloride, hydrazine hydrochloride, 2,4-dinitrophenol-hydrazine, p-chlorophenol, 4-chloro-2-aminophenol, o-cresol, p-chloro-m-cresol, 2,4-dichlorophenol,

25. resorcinol, pyrocatechol, pyrogallol, betanaphthol, 2,7-dihydroxynaphthalene, hydroquinone, hydroquinone sulphate, 1,2-naphthoquinone, 1,2-cyclohexanediol, aminotriazole, sodium chlorate and sodium nitride.

It is understood that the foregoing detailed

30. description is given merely by way of illustration and that variations may be made therein without departing from the spirit of the invention.



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CLAIMS

1. A nonaqueous liquid heavy duty laundry detergent composition which comprises
at least one liquid nonionic surfactant detergent,
an organic nitrilotriacetic acid detergent builder and
an inorganic zeolite detergent builder.

2. A detergent composition as claimed in claim 1 comprising at least one of the members of the group consisting of
at least one anti-gelling agent selected from the group consisting of an acid terminated nonionic surfactant and an alkylene glycol monoalkyl ether and
at least one stabilizing agent selected from the group consisting of an aluminium salt of a higher aliphatic carboxylic acid and an alkanol phosphoric acid ester.

3. A detergent composition as claimed in claim 1 or claim 2 comprising one or more detergent adjuvants selected from the group consisting of anti-incrustation agents, bleaching agents, bleach activators, sequestering agents, anti-redeposition agents, optical brighteners, enzymes, perfumes and dyes.

4. A detergent composition as claimed in anyone



of Claims 1 to 3 comprising 5 to 40 percent of an organic nitrilotriacetic acid detergent builder and 10 to 45 percent of an inorganic zeolite detergent builder.

5. A detergent as claimed in anyone of claims 1 to 4 comprising 5 to 20 percent of an alkylene glycol mono alkyl ether of the formula $RO(CH_2CH_2O)_nH$ where R represents a C_2 to C_8 alkyl group and n is a number having an average value in the range of from about 1 to 6.

6. A composition as claimed in anyone of claims 1 to 5 comprising 0.25 to 3.0 percent of an aluminium salt of a C_8 to C_{22} higher aliphatic carboxylic acid.

7. A composition as claimed in anyone of claims 1 to 6 comprising 2 to 8.0 percent of a copolymer of polyacrylate and polymaleic anhydride alkali metal salt as an anti-incrustation agent.

8. A composition as claimed as anyone of claims 1 to 7 in which the nonionic surfactant has dispersed therein inorganic detergent builder particles having a particle size distribution such that no more than about 10% by weight of the said particles have a particle size of more than about 10 microns.



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9. A laundry detergent composition as claimed in anyone of claims 1 to 8 which is free or substantially free of polyphosphate or is a low polyphosphate composition.

10. A composition as claimed in anyone of claims 1 to 8 which comprises

at least one liquid nonionic surfactant in an amount of about 25 to 45%,

an acid-terminated nonionic surfactant in an amount of about 3 to 15%,

an organic nitrilotriacetic acid detergent builder in an amount of about 10 to 20%,

an organic zeolite detergent builder in an amount of about 10 to 25%,

an alkylene glycol monoalkyl ether selected from the group consisting of ethylene glycol monoethyl ether, diethylene glycol monobutyl ether, tetraethylene glycol monobutyl ether and dipropylene glycol monomethyl ether in an amount of 5 to 15%,

a polyphosphate detergent builder in an amount of about 0 to 30%, and

and aluminium salt of a C₈ to C₂₂ higher aliphatic carboxylic acid in an amount of about 0.5 to 2.0%.

11. A laundry detergent composition as claimed in anyone of claims 1 to 10 comprising

a copolymer of polyacrylate and polymaleic



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anhydride alkali metal salt anti-incrustation agent in an amount of about 2 to 8%,

an alkali metal perborate monohydrate bleaching agent in an amount of about 2 to 6%,

diethylenetriamine pentamethylene phosphoric acid sodium salt sequestering agent in an amount of about 0.5 to 2.0%,

an anti-redeposition agent in an amount of about 0.5 to 2.0%, and optionally one or more detergent adjuvants selected from the group consisting of optical brighteners, enzymes, perfumes and dyes.

12. A laundry detergent composition as claimed in anyone of Claims 1 to 11 in which the organic detergent builder comprises a sodium salt of nitriloacetic acid.

13. A laundry detergent composition as claimed in anyone of claims 1 to 12 in which the inorganic detergent builder comprises an alkali metal crystalline aluminosilicate zeolite.

14. A laundry detergent composition as claimed in anyone of claims 1 to 13 which contains an aluminium salt which comprises aluminium stearate.



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15. A low phosphate detergent composition as claimed in any one of Claims 1 to 14 which contains no more than 15% polyphosphate.

16. A low phosphate detergent composition as claimed in anyone of claims 1 to 15 which comprises a polyphosphate builder salt in an amount of about 5 to 15%.

17. A detergent builder nonaqueous liquid heavy duty laundry detergent composition which comprises

Nonionic surfactant in an amount of about	30-40%;
Acid Terminated nonionic surfactant in an amount of about	4-10%;
Sodium salt of nitrilotriacetic acid (NTA) builder in an amount of about	5-15%;
Sodium salt of crystalline aluminosilicate zeolite in an amount of about	15-20%;
Copolymer of polyacrylate and polymaleic anhydride sodium salt in an amount of about	3-5%;
Diethylene glycol monobutylether in an amount about	8-12%;
A polyphosphate detergent builder in an amount of about	0-30%;



Aluminium tri-stearate stabilizing agent
in an amount of about 0.75-1.25%;
Sodium perborate monohydrate bleaching
agent in an amount of about 8-12%;
Tetraacetylene diamine (TAED) bleach
activator in an amount of about 3.5-5.5%

18. A detergent composition as claimed in claim 17 in which the composition comprises an anti-redeposition agent and anti-encrustation agent, and a sequestering agent for the bleach.

19. A detergent composition as claimed in claim 1 substantially as specifically described herein with reference to the example.

20. A method for cleaning soiled fabrics which comprises contacting the soiled fabrics with a laundry detergent composition as claimed in anyone of claims 1 to 19.
