In a one aspect, there is provided the use of an automatic dishwashing composition comprising:

(i) a chelating agent selected from hydroxyethyliminodiacetic acid, glucoheptonic acid, hydroxyethylethylenediaminetriacetic acid, poly(acrylic acid-co-hypophosphite), and salts, complexes and mixtures thereof; and

(ii) one or more further chelating agents selected from 1-hydroxyethylidene –1,1–diphosphonic acid (HEDP), ethylenediamine disuccinic acid (EDDS), methylglycinediacetic acid (MGDA), glutamic acid, N,N-diacetic acid (GLDA), iminodisuccinic acid (IDS); ethylenediaminetetraacetic acid (EDTA) diethylenetriaminepentaacetic acid (DTPA), diethylenetriamine-penta-methylene phosphonic acid (DETPMP), nitrilotriacetic acid (NTA), aspartic acid diethoxysuccinic acid (AES), aspartic acid-N,N-diacetic acid (ASDA), diethylenetriaminepentamethylene-phosphonic acid (DTPMPA), ethylenediamine tetra methylene phosphonic acid (EDTMP), iminodifumaric (IDF), iminoditartaric acid (IDT), iminodimaleic acid (IDMAL), iminodimalic acid (IDM), ethylenediaminedifumaric acid (EDDF), ethylenediaminedimalic acid (EDDM), ethylenediaminеditartaric acid (EDDT), ethylenediaminedimaleic acid and (EDDMAL), aminotri(methylenephosphonic acid) (ATMP), and salts complexes and mixtures thereof; to remove tannin-containing stains from dishware;

wherein the composition is substantially free of phosphate containing builders and substantially free of bleaching compounds.

In another aspect, there is provided an automatic dishwashing composition comprising:

(a) a chelating agent selected from hydroxyethyliminodiacetic acid, glucoheptonic acid, hydroxyethylethylenediaminetriacetic acid, poly(acrylic acid-co-hypophosphite), and salts, complexes and mixtures thereof; and

(b) one or more phosphonate based chelating agents selected from 1-hydroxyethylidene –1,1–diphosphonic acid (HEDP), diethylenetriaminepentamethylene-phosphonic acid (DTPMPA), ethylenediamine tetra methylene phosphonic acid (EDTMP), aminotri(methylenephosphonic acid) (ATMP), and salts complexes and mixtures thereof; and

(c) one or more additional chelating agents,which are not phosphonate based and whicha re biodegradable, selected from ethylenediamine disuccinic acid (EDDS), methylglycinediacetic acid (MGDA), glutamic acid, N,N-diacetic acid (GLDA), iminodisuccinic acid (IDS), nitrilotriacetic acid (NTA) and salts, complexes and mixtures thereof;

wherein the composition is substantially free of phosphate containing builders and substantially free of bleaching compounds.

In another aspect, there is provided the use of a chelating agent selected from hydroxyethyliminodiacetic acid, glucoheptonic acid, hydroxyethylethylenediaminetriacetic acid, poly(acrylic acid-co-hypophosphite), and salts, complexes and mixtures thereof to improve the stain-removing performance of an automatic dishwashing composition wherein the composition is substantially free of phosphate containing builders and substantially free of bleaching compounds.

In another aspect, there is provided a method of washing dishware in an automatic dishwasher, the method comprising adding to the dishwasher a unit dose of a composition as defined above and running a cycle of the dishwasher.

According to ~~a first aspect~~an embodiment of the present ~~invention~~disclosure there is provided an automatic dishwashing composition comprising a chelating agent selected from hydroxyethyliminodiacetic acid, glucoheptonic acid, hydroxyethylethylenediaminetriacetic acid, poly(acrylic acid-co-hypophosphite), and salts, complexes and mixtures thereof;

wherein the composition is substantially free of phosphate containing builders and substantially free of bleaching compounds.

The phosphate containing builders typically used in automatic dishwashing compositions are oligophosphate ions, most commonly the tripolyphosphate pentaanion, the pyrophosphate tetraanion, and the cyclic trimetaphosphate trianion. These builders are generally available as sodium, potassium, or mixed metal salts.

The automatic dishwashing compositions of the present invention are substantially free of such phosphate containing builders. By substantially free of we mean than builders of this type are present in the compositions of the present invention in an amount of less than 1 wt%, preferably less than 0.5 wt%, more preferably less than 0.25 wt%, preferably less than 0.1 wt%, suitably less than 0.05 wt%, more preferably less than 0.01 wt%, preferably less than 0.005 wt% and most preferably less than 0.001 wt%.

As mentioned above typical bleaching components used in automatic dishwashing compositions include hypochlorite or "chlorine bleaches" which contain or deliver hypochlorite (OCl^-) in solution, and peroxygen bleaches, typically perborate or percarbonate salts, which produce peroxide in aqueous solutions. The automatic dishwashing composition of the present invention is substantially free of such bleaching compounds. By this we mean that the compositions preferably comprise less than 1 wt% of such bleaching compounds, preferably less than 0.5 wt%, more preferably less than 0.25 wt%, preferably less than 0.1 wt%, suitably less than 0.05 wt%, more preferably less than 0.01 wt%, preferably less than 0.005 wt% and most preferably less than 0.001 wt%.

The chelating agent is preferably present in an amount of at least 0.5 wt%, preferably at least 1 wt%, more preferably at least 1.5 wt%, suitably at least 2 wt%, preferably at least 2.5 wt%, more preferably at least 3 wt%, suitably at least 3.5 wt% and more preferably at least 4 wt%.

The chelating agent may be present in an amount of up to 45 wt%, suitably up to 40 wt%, preferably up to 37 wt%, more preferably up to 35 wt% and most preferably up to 32 wt%. In some embodiments it may be present in an amount of up to 25 wt%, suitably up to 20 wt%, for example up to 17 wt% or up to 15 wt%.

According to ~~a second aspect~~another embodiment of the present ~~invention~~disclosure there is provided the use of a composition ~~of the first aspect~~as disclosed herein to remove stubborn stains from dishware. Preferably the stubborn stains are tannin-containing stains, such as tea stains.

According to ~~a third aspect~~another embodiment of the present ~~invention~~disclosure there is provided the use of a chelating agent selected from hydroxyethyliminodiacetic acid, glucoheptonic acid, hydroxyethylethylenediaminetriacetic acid, poly(acrylic acid-co-hypophosphite), and salts and mixtures thereof to improve the stain-removing performance of an automatic dishwashing composition wherein the composition is substantially free of phosphate containing builders and substantially free of bleaching compounds.

Preferably the use ~~of the third aspect~~as disclosed herein improves the performance of the composition at removing stubborn stains, for example tannin-containing stains, such as tea stains. This can be measured by the test described herein in example 4.

According to ~~a fourth aspect~~another embodiment of the present ~~invention~~disclosure there is provided a method of washing dishware in an automatic dishwasher, the method comprising adding to the dishwasher a unit dose of the composition ~~of the first aspect~~as disclosed herein and running a cycle of the dishwasher.

A unit dose is preferably from 5g to 60g, suitably from 10g to 45g. The dishwasher should be operated according to the manufacturer's instructions.

The invention will now be further described by the following non-limited examples. In the examples the amounts of each chelating agent refer to the amount that would be present as equivalent free acid but in some cases a sodium salt is used as a commercial source. The commercial source may also contain solvents and/or impurities but the amounts below refer to the level of active ingredient present.

Examples

Liquid dishwashing compositions were prepared comprising 9 wt% sodium carbonate, 15 wt% sodium silicate, and the further components listed in table 1 by dissolution in deionised water.

The pH of the solution was adjusted to 12.4-12.6 using sodium hydroxide and the balance to 100 wt% was provided with deionised water.

The compositions were then tested according to the following procedure: