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(54) **RINSING OF POLYCARBONATE**

(57) There are provided aqueous rinsing composition for rinsing a surface, preferably wherein the surface comprises at least partially a polycarbonate surface. Furthermore, there are provided concentrate compositions for the preparing of said rinsing compositions.

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Description

TECHNICAL FIELD

[0001] The present invention relates to cleaning and/or rinsing compositions for the purpose of cleaning and/or rinsing of surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces. The present invention also relates to corresponding methods of cleaning and/or rinsing of surfaces.

BACKGROUND ART

[0002] In the food and beverage industry, polymeric materials are frequently used. For example, polyethylene terephthalate (PET), polyacrylate, polycarbonate and the like may be present in molds, for example chocolate molds, in bottles such as soda bottles, in food and beverage plant equipment, and the like. Especially polycarbonate is used for bottle material and dairy industries (water, milk, baby bottles). Polycarbonate is also used in institutional markets for trays but also for roofs, e.g. railway stations, stadiums, arenas. In medical segments polycarbonate is used for dialysis, connectors and appliance systems. Furthermore, polycarbonate is used for machinery parts such as cover of e.g. slicers, packaging machines and for separation between different production areas.

[0003] These surfaces are typically cleaned with an alkaline composition, e.g. based on sodium/potassium hydroxide. This caustic/alkaline detergents may contain surfactants. Furthermore, oxidizers, e.g. chlorine, are added to alkaline cleaning formulations. These products are used in a concentration from 0.3 to 20 %. The cleaning of bottles, trays and molds in normal cases takes place in a tunnel washing machine by spraying the detergent on the polycarbonate surfaces.

[0004] The problem of these alkaline products having a pH-value of typically above 11 is that stress cracking occurs due to internal stress of the polycarbonate article. The internal stress typically results from molding or fitting when producing the polycarbonate article. It is also known and will be shown below by test results that also surfactants can damage polycarbonate articles.

[0005] It is pointed out that stress cracking is highly undesirable for several reasons. In the case of molds stress cracking can cause problems when the mold leaves polycarbonate fragments in the product. In some cases stress cracking can cause processing lines to shut down which is very costly for a plant.

[0006] There have been made several attempts to provide cleaning and rinsing compositions which do not cause damages and/or stress cracking, respectively, to plastic articles, especially to articles made of polycarbonate. US patent 3,993,575 discloses an acid cleaner and brightener concentrate composition comprising a dicarboxylic acid, an amine and water having an pH of about 1 to about 3 which is useful in the removal of tenacious soil from vehicles without subsequent harm to surfaces including coated polycarbonate glass substitute.

[0007] US patent 4,505,836 discloses a process of cleaning a polycarbonate surface or bottle including washing the surface or bottle with a composition consisting essentially of an aqueous basic solution containing the members: alkali metal carbonate, alkali metal bi-carbonate and a mixture of mono- and diesters of phosphoric acid and then rinsing the surface or bottle with water.

[0008] US patent 5,223,162 discloses a washing composition for inhibiting stress cracking in poly(alkaline terephthalate) or polycarbonate articles by applying to the article a hydrophilic substituted aromatic hydrocarbon having either an alkyl or aryl side chain such as a sodium sulfonate. The washing composition is prepared from a concentrate comprising an alkaline metal hydroxide, a chelant or sequestrant, the stress cracking inhibitor and water.

[0009] In the WO97/06229 it is disclosed that many conventional aqueous alkaline and acid cleaners promote stress cracking of polycarbonate plastics. Said WO-application therefore provides an aqueous liquid composition containing dihydrogen-phosphate salt, sulfur containing surfactant and preferably a small amount of phosphoric acid which is stated to clean soiled metal surfaces without damaging plastic parts, especially made of polycarbonate, that come into contact with the composition.

[0010] The European Patent Application EP0844301 discloses that mold removal from plastic bottles such as polyester polycarbonate bottles can be significantly enhanced by adding to a typical caustic soaking solution an effective amount of a complex polyphosphate such as sodium tri-poly phosphate and a surfactant. It is further disclosed that mold removal can be further enhanced by combining with the phosphate and surfactant either a phosphonate and/or a chelating agent such as sodium glucoheptonate. This combination is stated to significantly improve mold removal but does not increase stress cracking of the plastic bottle.

[0011] The WO98/59072 discloses an additive for a detergent formulation comprising a sequestrant preferably selected from the group of nitriloacetic acid (NTA), beta-alanine diacetic acid (β -ADA), methyl glycine diacetic acid (MGDA), serine diacetic acid (SDA) and ethyl glycine diacetic acid (EGDA) and further comprising a non-ionic surfactant and or a hydrotrope. The use of a detergent formulation containing said additives for cleaning in particular PET or polycarbonate bottles is described.

[0012] The German Offenlegungsschrift DE10 2004 055 492 discloses a rinsing composition for automatic dishwash-

ing, especially suitable for rinsing plastic articles. Said rinsing composition comprises C_8 - C_{20} -alkyl-bis-(2-hydroxy alkyl) amine as a detergent compound as well as at least one acid compound. The rinsing composition is stated to reduce or to inhibit the occurrence of stress cracking in the plastic article.

[0013] The above cleaning and rinsing compositions of the state of the art have the disadvantage of not being suitable for cleaning and rinsing of especially polycarbonate articles used in the food and beverage industry, especially polycarbonate molds used for the production of chocolate. This is due to the fact that either the cleaning and rinsing results are not good enough and/or there remain problems with respect to stress cracking.

[0014] It is therefore an object of the present invention to provide a cleaning and/or rinsing composition which has good cleaning and rinsing properties, including good soil carrying and anti organic depositing (e.g. cacao pigments) and anti scaling (e. g. mineral deposits from hard water) properties and which causes no problems with respect to stress cracking, especially on polycarbonate articles, even if the cleaning and rinsing composition is not removed after being applied to the surfaces to be cleaned and/or rinsed.

DESCRIPTION OF THE INVENTION

[0015] The present invention solves the above-mentioned problem by an aqueous cleaning composition comprising a special blend of complexing, especially chelating and/or sequestering agents, and one or more of certain surfactants, namely comprising:

a) a di- or oligoimide derived from dicarboxylic acids, preferably from C_2 - C_6 -alkyl diacids, most preferably from succinic acid and salts thereof, e.g. iminodisuccinic acid salt;

b) one, preferably two, or more sequestering agents selected from the group of polyphosphates, gluconic acid, polycarboxylic acids, hydroxy polycarboxylic acids, phosphonic acids, and the water-soluble salts thereof;

c) one or more surfactant(s) independently selected from the group comprising anionic, amphoteric and non-ionic surfactants; and

d) water,

wherein the pH-value of the concentrate composition is below 11, preferably below 10.5.

[0016] The invention refers to:

1. A concentrate composition for preparing an aqueous cleaning composition for cleaning a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, the concentrate composition comprising:

a) a di- or oligoimide derived from dicarboxylic acids, preferably from C_2 - C_6 -alkyl diacids, most preferably from succinic acid and salts thereof, e.g. iminodisuccinic acid salt;

b) one, preferably two, or more sequestering agents selected from the group of polyphosphates, polycarboxylic acids, hydroxy polycarboxylic acids, phosphonic acids, gluconic acid, and the water-soluble salts thereof; and

c) one or more surfactant(s) independently selected from the group comprising anionic, amphoteric and non-ionic surfactants;

wherein the pH-value of the concentrate composition is below 11, preferably below 10.5.

2. The concentrate composition according to 1, wherein the concentrate composition does not comprise NaOH, KOH, other hydroxides, nitrilotriacetic acid or ethylene diamino tetraacetic acid or combinations thereof.

3. The concentrate composition according to any of the preceding, wherein the non-ionic surfactant is a branched ethoxylated and/or propoxylated C_{10} - C_{22} alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10, preferably a C_{16} guerbet alcohol having a degree of ethoxylation of 2.

4. The concentrate composition according to any of the preceding, wherein the anionic surfactant is a phosphate polyether ester and/or an alkylated aryl sulfonate, preferably a cumene sulfonate.

5. The concentrate composition according to any of the preceding, further comprising a stabilizing agent, preferably

selected from the group comprising propylene glycol butylether, ethanol, isopropylether, n-propanol, and other glycoles.

6. An aqueous cleaning composition for cleaning a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, comprising:

- a) the concentrate composition according to any of claims 1 to 5, and
- b) water,

wherein the pH-value of the cleaning composition is below 11, preferably below 10.5.

7. The aqueous cleaning composition according to 6, wherein:

- a) the water is present in an amount of 10-90 wt.-%,
- b) the di- or oligoimide derived from dicarboxylic acids or salt thereof in an amount of 10-90 wt.-%,
- c) the sequestering agent(s) is/are present in an amount of 0.5-10 wt.-%, and
- d) the surfactant(s) is/are present in an amount of 1-20 wt.-%.

8. An aqueous cleaning composition comprising:

- a) water in an amount of 10-90 wt.-%, and
- b) an iminodisuccinic acid salt in an amount of 10-90 wt.-%, and
- c) tripolyphosphat in an amount of 0.5-10 wt.-%, and/or
- d) a gluconate in an amount of 1-20 wt.-%, and
- e) a phosphate polyether ester in an amount of 0.05-5 wt.-%, and
- f) propylene glycol butylether in an amount of 0.1-10 wt.-%.

9. Use of a composition according to any of 1 to 8 for the purpose of cleaning a surface, preferably wherein the surface comprises at least partially a polycarbonate surface.

10. A concentrate composition for preparing an aqueous rinse aid composition for rinsing surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces, the concentrate composition comprising:

- a) a branched ethoxylated and/or propoxylated C₁₀-C₂₂ alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10, preferably a C₁₆ guerbet alcohol having a degree of ethoxylation of 2, and
- b) an alkylated aryl sulfonate, preferably a cumene sulfonate,

wherein the pH value of the concentrate rinse aid composition is preferably in the range between 3 and 9, preferably between 7 and 9.

11. The concentrate composition according to 10, further comprising a stabilizing agent, preferably selected from the group comprising propylene glycol butylether, ethanol, isopropylether, n-propanol, and other glycoles.

12. An aqueous rinse aid composition for rinsing surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces, comprising:

- a) the concentrate composition according to 10 or 11, and
- b) water,

wherein the pH-value of the aqueous rinse aid composition is preferably in the range between 3 and 9, preferably between 7 and 9

13. The aqueous rinse aid composition according to 12, wherein:

- a) the water is present in an amount of 20-95 wt.-%, and
- b) the branched ethoxylated and/or propoxylated C₁₀-C₂₂ alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10 is present in an amount of 1-15 wt.-%, and
- c) the alkylated aryl sulfonate is present in an amount of 5-50 wt.-%, and

d) optionally, the stabilizing agent is present in an amount of 1-30 wt.-%.

14. Use of a composition according to any of 10 to 13 for the purpose of rinsing surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces.

15. A method of cleaning and, optionally, rinsing a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, comprising the steps:

- a) applying to the surface the cleaning composition according to any of claims 6 to 8, and
- b) optionally removing the cleaning composition from the surface, preferably by rinsing the surface with water, and/or
- c) optionally applying to the surface the rinse aid composition according to claims 12 or 13, and
- d) optionally removing the rinse aid composition from the surface, preferably by drying with warm or hot air.

16. A method of rinsing a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, comprising the steps:

- a) applying to the surface the rinse aid composition according to 12 or 13, and
- d) optionally removing the rinse aid composition from the surface, preferably by drying with warm or hot air.

[0017] In a preferred embodiment of the invention the cleaning composition does not comprise NaOH, KOH, other hydroxides, nitrilotriacetic acid (NTA) or ethylene diamino tetraacetic acid (EDTA) or combinations thereof.

[0018] The cleaning composition of the present invention is highly compatible with polycarbonate materials and do not cause any stress cracking but is very suitable to remove deposits, especially chocolate deposits. This will be shown in detail in the examples below.

[0019] In preferred embodiments of the invention the one or more surfactants are non-ionic and/or anionic surfactants. From the group of the non-ionic surfactants there are preferred especially the branched ethoxylated and or propoxylated C₁₀-C₂₂ alcohols having a degree of ethoxylation and/or propoxylation of 1 to 10, preferably a C₁₆ guerbet alcohol having a degree of ethoxylation of 2.

[0020] Further suitable non-ionic surfactants are alkylpolyglycosides; amineoxides, e.g. laurylamine; copolymeric carboxylates, e.g. acrylic/maleic copolymers or other copolymers of either maleic or acrylic acid; and hydrotropes, e.g. octyliminodipropionate. However, due to the foaming properties of the amineoxides these surfactants are less suitable for so-called cleaning-in-the-place (CIP) or passing-through applications as long as no antifoaming agents are added or the concentration of said amines is not very low.

[0021] Specific examples of, in general, suitable surfactants are the surfactants nrs. 1, 2, 24, 46, 51 (alkylpolyglycosides), nrs. 19, 50, 53, 59 (anionic surfactants), nr. 47 (amineoxide), nr. 3 (amphoteric surfactant), nrs. 23, 38, 39, 57 (non-ionic surfactants) and nrs. 48, 49 disclosed below in table 4.

[0022] From the group of anionic surfactants phosphate polyether ester and/or alkylated aryl sulphonates, especially the alkali cumene sulphonates, are preferred. These surfactants do not only improve the cleaning properties of the cleaning composition of the invention and have the function to facilitate the drying process due to their ability to reduce interfacial tension but furthermore have good material compatibility properties.

[0023] The di- or oligoimides derived from dicarboxylic acids used as chelating agent in the cleaning composition of the invention are di- or oligoimides derived from C₂ - C₆ alkyl diacids, preferably derived from succinic acids, and most preferably an iminodisuccinic acid salt, e.g. the sodium salt (CAS-No. 144538-83-0). These di- or oligoimides are preferably present in the aqueous cleaning composition in an amount of 10 to 90 weight %, preferably in an amount of 20 to 60 weight %.

[0024] Even if the water used in the cleaning composition is soft, i.e. has a water hardness of °dH below 7, the use of chelating agents is recommended. This is due to the fact that in the soil to be removed, especially in chocolate, calcium and magnesium ions are present. These calcium and magnesium ions may react with solved carbon dioxide, e.g. from the air, under carbonization.

[0025] The sequestering agents are present in the cleaning composition of the invention in order to inhibit crystal growth which would lead to limestone deposits. The sequestering agents are selected from the group of polyphosphates, gluconic acid, polycarboxylic acids, hydroxy polycarboxylic acids, phosphonic acids, and the water-soluble salts thereof. Examples of appropriate sequestering agents are penta sodium triphosphate, citric acid, 2-phosphonobutane-1,2,4-tricarboxylic acid, and the water-soluble salts thereof. Even if not preferred also nitrilotriacetic acid (NTA) and/or ethylene diamino tetraacetic acid (EDTA) may be used as sequestering agents. NTA and EDTA are not preferred due to their alkalinity, their toxicity and harmfulness to the environment. Further appropriate sequestering agents are methyl glycin diacetic acid, dicarboxymethyl-L-glutamic acid, serine diacetic acid, imidosuccinic acid, poly acrylic acids and copolymers of

maleic anhydride and acrylic acids as well as salts thereof. Commercially available are e.g. Sokalan® CP5 and PA 30 from BASF, Alcosperse® 175 and 177 from Alco, LMW® 45 N and SPO2 ND from Norsohaas. Suitable natural polymers are for example oxidized starch (e.g. DE 42 28 786) and polyglutamine acids or polyasparagine acid. Furthermore, suitable phosphonic acid are e.g. 1-hydroxyethyl-1,1-diphosphonic acid, diethylenetriamine pentamethylenephosphonic acid or ethylenediaminetetramethylenephosphonic acid or salts thereof. The sequestering agent is preferably present in an amount of 1 to 30 weight %, preferably in an amount of 5 to 20 weight %.

[0026] A particularly preferred sequestering agent is a mixture of a tripolyphosphate and a gluconate, for example potassium tripolyphosphate and sodium gluconate. If a mixture of tripolyphosphate and sodium gluconate is used the polyphosphate is present in an amount of 0.5 to 10 weight %, preferably 1 to 4 weight %, and the gluconate is present in an amount of 1 to 20 weight %, preferably 3 to 10 weight %.

[0027] Especially in the cases where the applied cleaning composition is not removed after application from the surfaces to be cleaned, especially from polycarbonate surfaces, the cleaning composition of the present invention is free of NaOH, KOH, other hydroxides, nitrilotriacetic acid (NTA) or ethylenediaminetetraacetic acid (EDTA) or combinations thereof in order not to damage said surfaces. "Not comprising" in the sense of the present invention means that the amount of each of said compounds is below 5 weight %, preferably 2 weight %, more preferably 0.5 weight %.

[0028] The cleaning composition of the invention may further comprise a stabilizing agent, preferably selected from the group comprising propylene glycol butylether, ethanol, isopropylether, n-propanol, and other glycols. The stabilizing agent is preferably present in an amount of 0.1 to 10 weight %, preferably in an amount of 0.5 to 5 weight %.

[0029] As mentioned above the pH value of the cleaning composition of the invention should be below 11 and preferably below 10.5. However, in order to provide good cleaning properties it is preferred that the pH value is not below 7, preferably not below 8 since the sequestering agents have only a poor or even no performance in neutral or acidic range.

[0030] In a typical embodiment the aqueous cleaning composition comprises a) the water in an amount of 10-90 wt.-%, b) the di- or oligoimide derived from dicarboxylic acids or salt thereof in an amount of 10-90 wt.-%, c) the sequestering agent(s) in an amount of 0.5-10 wt.-%, and d) the surfactant(s) in an amount of 1-20 wt.-%.

[0031] In another preferred embodiment the aqueous cleaning composition comprises: a) water in an amount of 10-90 wt.-%, and b) an imino oligosuccinate in an amount of 10-90 wt.-%, and c) tripolyphosphate in an amount of 0.5-10 wt.-%, and/or d) a gluconate in an amount of 1-20 wt.-%, and e) a phosphate polyether ester in an amount of 0.05-5 wt.-%, and f) propylene glycol butylether in an amount of 0.1-10 wt.-%.

[0032] In an alternative aspect of the invention the above cleaning composition is prepared from a concentrate composition containing less or even no water in order to save weight and volume which might be desirable for storing and/or transportation purposes. The components of the concentrate composition are the same as for the aqueous cleaning composition except for water which is added to said concentrate composition prior to the use of the resulting aqueous cleaning composition.

[0033] The above aqueous cleaning composition and concentrate composition may be used for the purpose of cleaning surfaces, preferably wherein the surfaces comprise at least partially a polycarbonate surface. However, also other plastic surfaces, as for example polyacrylate, polyethylene, polyoxymethylene (POM), can also be cleaned with the invented compositions without the risk of damages due to for example stress cracking. However, also plastic surfaces not sensitive to stress cracking, e.g. thermoplastic polymers and elastomers, can be cleaned with the invented compositions.

[0034] In a further aspect of the invention the above-mentioned problem is solved by an aqueous rinse aid composition comprising a) a branched ethoxylated and/or propoxylated C₁₀-C₂₂ alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10, preferably a C₁₆ Guerbet alcohol having a degree of ethoxylation of 2, and, preferably, b) an alkylated aryl sulfonate, more preferably a cumene sulfonate, wherein the pH value of the aqueous rinse aid composition is preferably in the range between 3 and 9, preferably between 7 and 9.

[0035] Also, the rinse aid composition of the present invention is highly compatible with polycarbonate materials and does not cause any stress cracking, but is very suitable to remove deposits, especially chocolate deposits. This will also be shown in detail in the examples below.

[0036] In preferred embodiments of this aspect of the invention, the aqueous rinse aid composition further comprises a stabilizing agent as for example propyleneglycol-butylether, ethanol, isopropylether, n-propanol, and other glycols, preferably propyleneglycol-butylether.

[0037] The above-mentioned branched ethoxylated and/or propoxylated C₁₀-C₂₂ alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10 is preferably present in an amount of 1 to 15 wt.-%, preferably in an amount of 3 to 8 wt.-%.

[0038] The alkylated aryl sulfonate which is an anionic surfactant, preferably a cumene sulphate, is preferably present in an amount of 5 to 50 wt.-%, preferably in an amount of 15 to 35 wt.-%.

[0039] The above stabilizing agent, preferably propyleneglycol-butylether, may be present in an amount of 1 to 30 wt.-%, preferably in an amount of 5 to 15 wt.-%.

[0040] As mentioned above for the cleaning composition, also the rinse aid composition of the present invention is preferably free of NaOH, KOH, other hydroxides, nitrilotriacetic acid (NTA) or ethylenediaminetetraacetic acid (EDTA)

or combinations thereof in order not to damage the surfaces to be rinsed, especially polycarbonated surfaces, especially in the cases where the applied rinse aid composition is not removed from said surfaces after its application.

[0041] In a further embodiment of this aspect of the invention the above aqueous rinse aid composition is prepared from a concentrate composition containing less or even no water in order to save weight and volume which may be desirable for storing or transportation purposes. The components of the concentrate composition are the same as for the aqueous rinse aid composition except for water which is added to said concentrate composition prior to the use of the resulting aqueous rinse aid composition.

[0042] The aqueous rinse aid composition and concentrate composition may be used for the same purposes as mentioned above for the cleaning compositions.

[0043] The present invention also includes a method of using the compositions described herein to clean and/or rinse polymeric surfaces, especially polycarbonate surfaces. The compositions may be applied to a polymeric surface in several ways including spraying, pouring, wiping, dipping, misting, rolling, and foaming the composition onto the polymeric surface. Further, the composition may be applied manually or as part of a clean-in-place cleaning program.

[0044] In one embodiment of the invention it is provided a method of cleaning and optionally rinsing a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, comprising the steps: a) applying to the surface the cleaning composition as described above, and b) optionally removing the cleaning composition from the surface, preferably by rinsing the surface with water, and/or c) optionally applying to the surface the rinse aid composition according as described above, and d) optionally removing the rinse aid composition from the surface, preferably by drying with warm or hot air.

[0045] In another embodiment of the invention, in cases where only rinsing of a surface is necessary, it is provided a method of rinsing a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, comprising the steps: a) applying to the surface the rinse aid composition as described above, and d) optionally removing the rinse aid composition from the surface, preferably by drying with warm or hot air.

[0046] When applied to a polymeric surface, the compositions are preferably applied at temperatures in the range of 20-70°C, preferably 40-60°C.

[0047] In summary, the cleaning and rinsing compositions according to the present invention have superior properties with respect to cleaning/rinsing performance, soil carrying ability (dispersing ability), ability to inhibit lime deposition (mineral deposits from hard water), ability to inhibit organic deposition (e.g. cacao pigments), possibility to monitor the concentration of the cleaning/rinsing composition by conductivity and with respect to material compatibility. Table 1 shows the respective performances of chlorine-alkaline, strong caustic and acidic cleaners as well as of the cleaner according to the present invention.

Table 1: Performances of various cleaning compositions

Performance of	alkaline chlorinated formulations	alkaline formulations	acidic formulations	formulation according to the invention
cleaning	+++	+++	-	+++
soil carrying	o	o/++	-	++
scale inhibiting	-	-/o	+++	++
inhibiting of organic deposits (cacao pigments)	o	o/+	-	++
online control	O	+++	+++	++
material compatibility (polycarbonate)	-	-	+++	++/+++
+++ : excellent, ++ : very good, + : good, o : only in some cases applicable, - : inapplicable				

Examples

[0048] Example 1: Table 2 shows the conditions and results of impact tests of traditional cleaner compositions on polycarbonate surfaces. In this example, a solution of the respective composition in demineralized water was prepared and applied to a polycarbonate test piece. Thereafter the polycarbonate surface was visually evaluated for defects in the surface. Results are shown in table 2.

Table 2: Conditions and results of impact tests of traditional cleaner compositions on polycarbonate surfaces.

	A	B	C	D	E	F	G	H	I	J
	%	%	%	%	%	%	%	%	%	%
Demi water	23	32	41	78	90	90		70	99	95
Sodium hydroxide (50%)		65			10					
Potassium hydroxide	28		9			10				
Sodiumhypochlorite	18									
Sodiumcarbonate	31		40	10			100	30		
Phosphonobutandicarboxylic acid		3	10							
Fat alcohol + 6 EO cocos				5					1	
Dimethyl dodecyl benzyl ammonium chloride				7						5
Σ	100	100	100	100	100	100	100	100	100	100
pH-value	12.4	11.0	12.7	11.7	10.4	12.0	12.0	11.7	8.2	8.0
Material compatibility	A5 C	A5 C	A5 C	A5 C	A5 C	A5 C	A5 C	A5 C	A4 C	A4 C
evaluation: visual inspection of surface defects such as crazes or stress cracking N: Not attacked, no defects A1: Tensile bars showed moderate drop in tensile elongation. A2: Tensile bars showed tensile elongation till just after yield. A3: Tensile bars showed elongation till yield only. A4: Tensile bars showed visible signs of crazing effects. A5: Tensile bars already broken in testing. W: Whitening effects, even after cleaning. C: Crazes visible. D: Surface defects other then crazes.										

[0049] Further test conditions [see also figure 1]:

Duration:	7 days (a. complete soak)
Concentration:	a) pure molten chocolate (Reference) b) detergent(s) 0.5% c) rinsing aid(s) 0.1 %
Temperature:	50°C (soak)
PC-qualities:	Lexan 164R (transparent); Makrolon 2808 (transparent)
Strength on the outer fiber:	1 %; ~21 N/mm ²
Number of tensile bars:	5 per solution, condition
Testmatrix:	standard size (10x80x4 mm) and shouldered test bars
Method	a: complete soak

[0050] Example 2: Table 3 shows the conditions and results of impact tests of various substances, e.g. whole milk chocolate, NTA, EDTA or pure sodium gluconate, and of the cleaning and rinsing compositions according to the present invention on polycarbonate surfaces. In this example, a solution of a composition in demineralized water was prepared and applied to a polycarbonate test piece for 168 hours at 50 °C. Thereafter the polycarbonate surface was visually evaluated for defects in the surface. Results are shown in table 3.

Table 3: Conditions and results of impact tests of various substances and of the cleaning and rinsing compositions according to the invention on polycarbonate surfaces.

	K	L	M	N	O	P	Q	R	S	T
	%	%	%	%	%	%	%	%	%	%
Demi water	100							42	42	70
Whole milk chocolate		100								
Dark chocolate			100							
NTA (40%)				100				50		
EDTA (40%)					100					
Iminooligosuccinat									45	
Phosphate polyether ester									0,5	
Guerbet alcohol C16 + 2EO										5
Potassium tri poly polyphate (50%)						100		5	5	
Sodium gluconate (100%)							100	3	5	
Propyleneglycolbutylether									2.5	10
Sodium cumene sulfonate 40%										25
Σ	100	100	100	100	100	100	100	100	100	100
pH-value	7.0	7.0	7.0	11.0	11.2	10.5	10.4	10.4	10.4	7.0
Material compatibility	N	A2	A2	A5	A5	A4	N	A4	N	N
conditions and evaluation: as in table 2										

[0051] Results in tables 2 and 3 show that only in examples **S** and **T** the polycarbonate material is not attacked and shows no defects.

[0052] Example 3: Table 4 shows the conditions and results of impact tests of various surfactants and of the guerbet alcohol Dehydol G162 used in the rinse aid composition of the invention on polycarbonate surfaces. In this example, a solution of a surfactant in demineralized water was prepared and applied to a polycarbonate test piece for 168 hours at 50 °C. Thereafter the polycarbonate surface was visually evaluated for defects in the surface. Results are shown in table 4.

Table 4: Conditions and results of impact tests of various surfactants and of the guerbet alcohol Dehydol G162 on polycarbonate surfaces.

No.	product	visual evaluation after... [in hours]											
		1	2	3	4	6	24	48	72	96	120	144	168
1	AG 6206	N	N	N	N	N	-	-	C0	C0	C0	C0	C0
2	AG 6202	N	N	N	N	N	N	N	N	N	N	N	N
3	Ampholak YJH-40	N	N	N	N	N	N	N	N	N	N	N	N
4	Berol EZ-1	C1	C1	-	-	-	C2	X	X	X	X	X	X
5	Berol EVC	C1	C2	-	-	-	C2	X	X	X	X	X	X
6	Berol 087	C1	C1	-	-	-	C2	X	X	X	X	X	X
7	Berol 533	C1	C2	-	-	-	C2	X	X	X	X	X	X
8	Berol 226	C1	C1	-	-	-	C1	X	X	X	X	X	X
9	Berol LFG 61	C1	C1	-	-	-	C2	X	X	X	X	X	X
10	Berol 2 FG 61	-	-	-	-	-	C2	X	X	X	X	X	X
11	Plurafac LF 303	-	-	-	-	-	C2	X	X	X	X	X	X
12	Plurafac LF 220	-	-	-	-	-	C2	X	X	X	X	X	X
13	Plurafac LF 226	-	-	-	-	-	C2	X	X	X	X	X	X
14	Plurafac LF 221	-	-	-	-	-	C2	X	X	X	X	X	X
15	Plurafac LF 120	-	-	-	-	-	C2	X	X	X	X	X	X
16	Pluronic PE 3100	-	-	-	-	-	C1	X	X	X	X	X	X
17	Pluronic PE 8100	-	-	-	-	-	C1	X	X	X	X	X	X
18	Lutensol AO 7	-	-	-	-	-	C1	X	X	X	X	X	X

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	19	Sokakalan CP 10	N	N	N	N	N	N	-	-	N	N	N
5	20	Plurafac LF 403	-	-	-	-	-	C2	X	X	X	X	X
	21	Demelan 1992	-	-	-	-	-	C0	X	X	X	X	X
10	22	Araphen K 100	N	N	N	N	N	C2	X	X	X	X	X
	23	Dehydol G 162	N	N	N	N	N	N	N	N	N	N	N
15	24	Glucopon 225 DK	N	N	N	N	N	N	-	-	N	N	N
	25	Dehydol LT 8	-	-	-	-	-	C0	X	X	X	X	X
20	26	Dehypon LS 54	-	-	-	-	-	C1	X	X	X	X	X
	27	Dehypon LT 104	-	-	-	-	-	C2	X	X	X	X	X
25	28	Emulgin O 2	-	-	-	-	-	C2	X	X	X	X	X
	29	Dehyquart LDB	-	-	-	-	-	C1	X	X	X	X	X
30	30	Myritol	-	-	-	-	-	C2	X	X	X	X	X
	31	Isopropylmyristat	-	C1	-	-	-	C2	X	X	X	X	X
35	32	Arlypon VPC	-	-	-	-	-	C1	X	X	X	X	X
	33	Dehypon 2555	-	-	-	-	-	C0	X	X	X	X	X
40	34	Dehypon LS 24	-	-	-	-	-	C1	X	X	X	X	X
	35	Dehydol LT 8	-	-	-	-	-	C0	X	X	X	X	X
45	36	Dehydol LT 6	-	-	-	-	-	C0	X	X	X	X	X
	37	Dehydol K 2394	-	-	-	-	-	C0	X	X	X	X	X
50	38	Dehydol LT 7	-	-	-	-	-	C0	C0	-	-	C0	Co
	39	Dehydol KE 2394	-	-	-	-	-	Co	Co	-	-	C0	Co
55	40	Dehypon LT 36	-	-	-	-	-	C2	X	X	X	X	X
	41	Dehypon LST 254	-	-	-	-	-	C2	X	X	X	X	X
	42	Dehydran 1513	-	-	-	-	-	C0	X	X	X	X	X

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	43	Dehydran 240	-	-	-	-	-	C0	X	X	X	X	X	X
5	44	Dehyquart LDB	-	-	-	-	-	C0	C1	X	X	X	X	X
	45	Texapon NSP UP	-	-	-	-	-	C1	X	X	X	X	X	X
10	46	Polyglycol 600	N	N	N	N	N	N	N	-	-	N	N	N
	47	Empigen OB	-	-	-	-	-	N	N	N	N	-	-	N
15	48	MERSOLAT H 30	-	-	-	-	-	N	N	N	N	-	-	C0
	49	So. Comusulfonate (40%)	-	-	-	-	-	N	N	N	C0	-	-	C0
20	50	Na. Comusulfonate (40%)	-	-	-	-	-	N	N	-	-	N	N	N
	51	Triton BG 10	-	-	-	-	-	N	N	-	-	N	N	N
25	52	Texapon NSP UP	-	-	-	-	-	C1	X	X	X	X	X	X
	53	Hostaphat OPS (30%)	-	-	-	-	-	N	N	-	-	N	N	N
30	54	Genapol PN 30	-	-	-	-	-	C1	X	X	X	X	X	X
	55	Stepantex DC 90	-	-	-	-	-	N	C0	C1	-	-	C2	C2
35	56	Degressal SD 20	-	-	-	-	-	C1	X	X	X	X	X	X
	57	Entschäumer HOE S 3470	-	-	-	-	-	N	N	-	-	N	N	N
40	58	Suma rinse (JD)	-	-	-	-	-	C2	X	X	X	X	X	X
	59	Pril	-	-	-	-	-	-	-	N	N	N	N	

evaluation: visual inspection of surface defects such as crazes or stress cracking

N: Not attacked, no defects

C0: first crazes.

C1: little surface crazes visible.

C2: clear, crazes visible.

C3: clear, deep crazes visible (nearly breaking).

Further test conditions:

PC-material: Lexan 164 R

H₂O °dH = 0 (demineralized water)

concentration: 0.1 %

Temp.: 50°C

Results in table 4 shows that only a few surfactants pass all tests with the result **N** (no attacks, no defects). Those surfactants which show good material compatibility, i.e. surfactants nr. 1-3, 19, 24, 38, 39, 46-51, 53, 57 und 59, have, however, the disadvantages of being too much foaming (nr. 2, 19, 24, 46, 47, 51, 53, 59 but could possibly combined with a non foaming/defoaming surfactant e. g. 23, 38, 39) and/or having poor surface tension reducing properties (nr. 57). However, most of the surfactants mentioned in table 4 have both poor material compatibility as well as the additional

disadvantages mentioned above.

[0053] However, Dehydol G 162 (nr. 23) is the only surfactant having passed all tests with **N** and additionally having no such disadvantages than other surfactants as mentioned above. Therefore, Dehydol G 162 has superior properties in CIP- and spray applications.

Claims

1. A concentrate composition for preparing an aqueous rinse aid composition for rinsing surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces, the concentrate composition comprising:

- a) a branched ethoxylated and/or propoxylated C10-C22 alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10, preferably a C16 guerbet alcohol having a degree of ethoxylation of 2, and
- b) an alkylated aryl sulfonate, preferably a cumene sulfonate,

wherein the pH value of the concentrate rinse aid composition is preferably in the range between 3 and 9, preferably between 7 and 9.

2. The concentrate composition according to claim 1, further comprising a stabilizing agent, preferably selected from the group comprising propylene glycol butylether, ethanol, isopropylether, n-propanol, and other glycoles.

3. An aqueous rinse aid composition for rinsing surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces, comprising:

- a) the concentrate composition according to claims 1 or 2, and
- b) water,

wherein the pH-value of the aqueous rinse aid composition is preferably in the range between 3 and 9, preferably between 7 and 9.

4. The aqueous rinse aid composition according to claim 3, wherein:

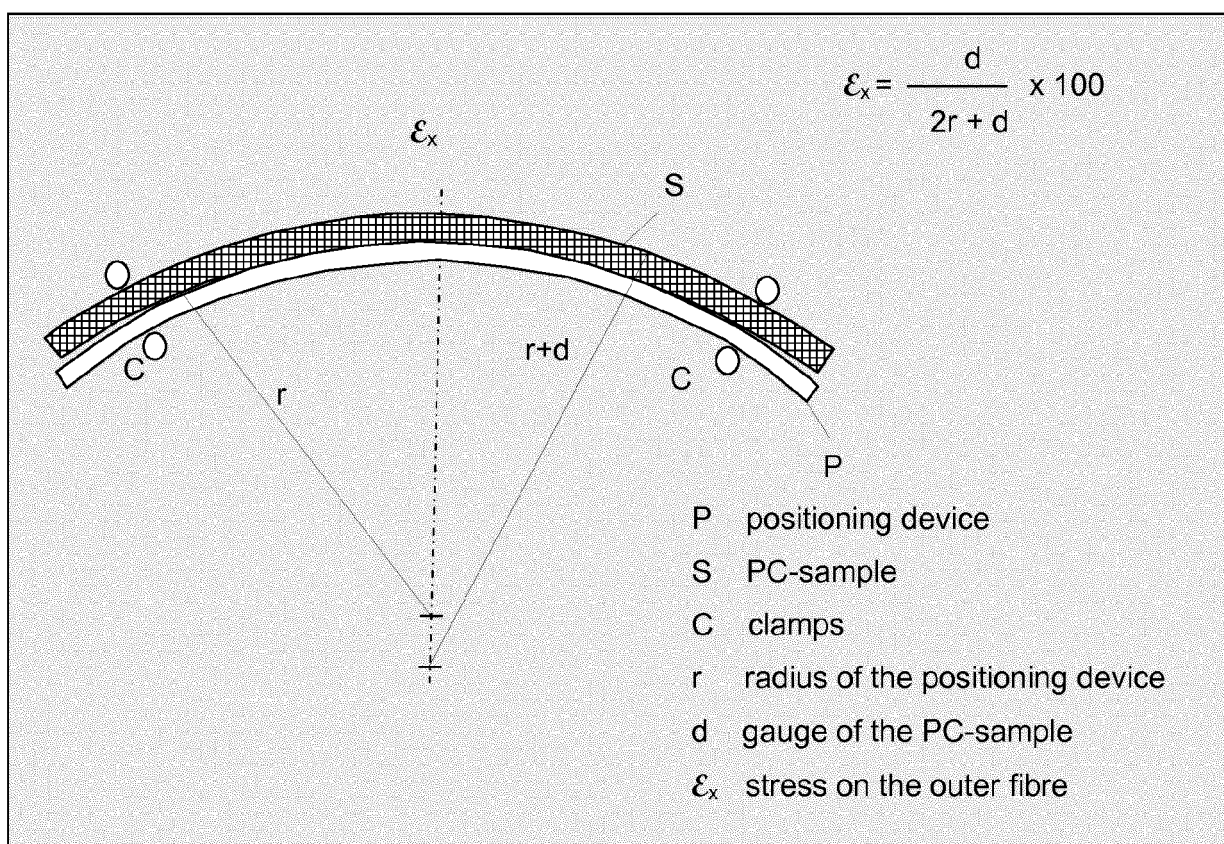
- a) the water is present in an amount of 20-95 wt.-%, and
- b) the branched ethoxylated and/or propoxylated C10-C22 alcohol having a degree of ethoxylation and/or propoxylation of 1 to 10 is present in an amount of 1-15 wt.-%, and
- c) the alkylated aryl sulfonate is present in an amount of 5-50 wt.-%, and
- d) optionally, the stabilizing agent is present in an amount of 1-30 wt.-%.

5. Use of a composition according to any of the claims 1 to 4 for the purpose of rinsing surfaces, preferably wherein the surfaces comprises at least partially polycarbonate surfaces.

6. A method of rinsing a surface, preferably wherein the surface comprises at least partially a polycarbonate surface, comprising the steps:

- a) applying to the surface the rinse aid composition according to claims 3 or 4, and
- b) optionally removing the rinse aid composition from the surface, preferably by drying with warm or hot air.

Figure 1





EUROPEAN SEARCH REPORT

 Application Number
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