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(54) Liquid dishwashing compositions.

(57) A liquid dishwashing composition, having a pH of from 5.0-8.3 , comprising :
i) 5-42% w/w of one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate, sodium lauryl sulphate and ammonium lauryl sulphate (hereinafter defined as component i) and
ii) 4-8% w/w of alkyl polysaccharide (hereinafter defined as component ii) ;
provided that when sodium lauryl ethoxy sulphate and olefin sulphonate and/or sodium lauryl sulphate are present in component i) the weight ratio of sodium lauryl ethoxy sulphate to olefin sulphonate and/or sodium lauryl sulphate is from 4 :1 to 1 :4 :
all percentages of components i) and ii) being by weight of actives present.

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This invention relates to liquid dishwashing compositions both in regular and concentrated form and in particular to compositions having a reduced level of surfactant.

There are many compositions known in the art that function as effective dishwashing compositions. With an increasing awareness of the need to minimise the environmental impact of such compositions, considerable effort has been directed to the formulation of dishwashing compositions which are not only effective but are also biodegradable or relatively safe in the environment.

As used in this specification, the term "liquid dishwashing composition" refers to compositions which are used for washing dishes by hand as distinct from compositions that are suitable for use in automatic dishwashing machines.

Many products have been proposed that are said to be environmentally safe and/or biodegradable whilst functioning as effective cleaners. However, whilst it would seem that there are suitable formulations available in the art, it would appear that such compositions rely upon conventional levels of surfactants. Clearly this has both cost and environmental implications.

Surprisingly, in attempting to solve the dual problem of maintaining effective performance with biodegradable and/or environmentally safe surfactants, it has now been found that it is possible to alleviate this problem whilst reducing the overall level of surfactant by using a composition according to the invention.

To this end, there is provided according to the invention a liquid dishwashing composition, having a pH of from 5.0-8.3 , comprising:

i) 5-42% (preferably 5-36%, more preferably 10-30, most preferably 15-25%) w/w of one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate, sodium lauryl sulphate and ammonium lauryl sulphate (hereinafter defined as component i) and

ii) 4-8% w/w of alkyl polysaccharide (hereinafter defined as component ii);

provided that when sodium lauryl ethoxy sulphate and olefin sulphonate and/or sodium lauryl sulphate are present in component i) the weight ratio of sodium lauryl ethoxy sulphate to olefin sulphonate and/or sodium lauryl sulphate is from 4:1 to 1:4:

all percentages of components i) and ii) being by weight of actives present.

For the avoidance of doubt, the surfactants of component i) include mixtures thereof.

The balance of the compositions according to the invention is water and conventional additives. Preferably the amount of water present is 30-87%.

Preferably the pH of the composition according to the invention is 5.5-7.5, more preferably 5.5 to 7.2, most preferred 5.5-6.5.

In a first preferred aspect of the invention (hereinafter the first preferred aspect) , the surfactants of component i) are selected from 5.6-42% w/w of one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate and sodium lauryl sulphate, these surfactants being alone or together with ammonium lauryl sulphate as an optional additional component.

Preferably in the first preferred aspect, two or more surfactants are present in component i).

Preferably in the first preferred aspect, component i) is present in an amount of 5.6 to 36%.

In a second preferred aspect of the invention (hereinafter the second preferred aspect), the surfactant of component i) is selected from ammonium lauryl sulphate, alone or together with one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate and sodium lauryl sulphate as optional components.

Preferably in the second preferred aspect, component i) is present in an amount of 5 to 25%, more preferably 10-25%, more preferably 15-25%.

Still further according to the invention, there is provided a liquid dishwashing composition having a pH of from 5.0-8.3 and comprising:

a) 2.8-18% w/w sodium lauryl ethoxy sulphate; and/or (preferably and)

b) 2.8-18% w/w of olefin sulphonate, sodium lauryl sulphate or mixtures thereof; and

c) 4.8% w/w of alkyl polysaccharide,

provided that the weight ratio of sodium lauryl ethoxy sulphate to olefin sulphonate, sodium lauryl sulphate or mixtures thereof is from 4:1 to 1:4.

Still further according to the invention, there is provided a liquid dishwashing composition having a pH of from 5.0-8.3 and comprising

a) 5-20% w/w of ammonium lauryl sulphate

b) 4-8% w/w of alkyl polysaccharide.

The surfactants of component i) are well known in the art and are available in a range of aqueous concentrations.

One of the components of component i), sodium lauryl ethoxy sulphate is also known as coconut ethoxy sulphate.

The olefin sulphonate of component i) may be either an alpha or beta olefin sulphonate although an alpha olefin sulphonate is preferred. An example of a commercially available olefin sulphonate is Ginasul 68P (from Gujaret Godrej Innovative Chemicals) which is available as a 95% powder or 38% liquid.

The secondary alkane sulphonates are preferably secondary C_{8-18} alkane sulphonates. These products are commercially available for example Hostapur SAS (from Hoechst) which is available as a 93% pellet, a 60% slurry or a 30% liquid.

Both olefin sulphonate, alkane sulphonate and sodium lauryl sulphate are readily available materials and will be generally used as 90-95% w/w solids.

In component ii), the alkyl polysaccharide is a C_{8-16} alkyl polysaccharide, preferably with one to three glucose units. Preferably the molecular weight of component ii) is 310 to 782. The alkyl chain of component ii) can be sourced from either petrochemical or vegetable feed stock and the polysaccharide from starch feed stocks (sugarcane, wheat, corn etc). The alkyl polysaccharides are commercially available. Examples of commercially available alkyl polysaccharides are Plantaren 600 CSUP (from Henkel) and Ecoteric AS10 (from ICI). The alkyl polysaccharide is usually available as an aqueous solution, typically about 50% w/v.

To facilitate the preparation of compositions, usually the surfactants of component i) are used as aqueous solutions.

When regular formulations of compositions according to the invention are prepared, the concentration of the surfactants of component i) will usually be in a relatively low concentration, the concentration being consistent with the required weight ratio.

For formulations of compositions according to the invention in concentrate form, the level of surfactants of component i) will be in relatively high concentrations, the concentration being consistent with the required weight ratio.

In this regard, it should be noted that the terms "regular formulation" and "formulation in concentrate form" both refer to formulations that are in a ready-to-use form. The difference between these formulations is that a reduced amount of a concentrate formulation would be used as compared to the amount needed of a regular formulation when dishwashing.

It should be noted that whilst the compositions of the first preferred aspect of the invention may be prepared in regular or concentrate form, the compositions of the second preferred aspect are usually only prepared as regular formulations.

The compositions of the invention are formulated to provide a pH in the range of from 5.0-8.3. In some cases, this means that no additional ingredients are required to obtain a suitable pH. In other cases, the addition of materials such as sodium citrate and/or citric acid are be required to obtain a suitable pH.

It is possible through the addition of a strongly ionic salt to produce compositions which have viscosities over a wide range. In some cases, no salt will be required whereas in others where a particularly viscous product is required, an addition of up to 2% w/w of salt may be required. Suitably salts include ammonium chloride, potassium chloride and sodium chloride.

To ensure that the compositions of the invention are adequately resistant to microbiological contamination, a preservative is often recommended to be included. A person skilled in the art would recognise that many preservative systems may be used in compositions according to the invention. Preferably the amount of preservative used is up to about 1% w/w. A preferred preservative system that can be so added comprises phenoxyethanol and 1,2-dibromo-1,2-dicyano butane.

As required, perfumes and dyes may also be included in the compositions of the invention to produce formulations having organoleptic characteristics as appropriate.

To prepare the compositions of the invention, generally the required amount of each of the surfactants of components i) and ii) are mixed together with an appropriate amount of water. Supplementary ingredients such as dyes, perfumes and preservatives are then added to the surfactants and are mixed until solubilized. If it is necessary to adjust the pH, then compounds such as sodium citrate and/or citric acid are then added. Strongly ionic salts can then be added, if necessary, to impart the requisite viscosity.

The invention will now be illustrated by the following Examples

The materials used in the Examples are as follows. Alkyl polysaccharide commercially 50% w/v solution available as *Ecoteric AS10* (from ICI) except for Example 2 :

Alkyl polysaccharide used in Example 2 is *Glucapon 600 CSUP* (from Henkel)	**50% w/v solution**
Secondary alkane sulphonate: (hereinafter SAS) commercially available as *Hostapur SAS* (from Hoechst)	**93% w/w solid pellets**
Alpha olefin sulphonate (hereinafter AOS) commercially available as *Ginasul 68P* (from Gujaret Godrej Innovative Chemicals)	**95% w/w powder**
Sodium lauryl sulphate: (hereinafter SLS)	90% w/w solid needles
Ammonium lauryl sulphate: (hereinafter ALS)	30% w/v aqueous solution
Sodium lauryl ethoxy sulphate: (hereinafter SLES)	70% w/v aqueous solution
1,2-dibromo-1,2-dicyanobutane	25% w/v aqueous solution

In the Examples, the amounts used are the actual amount of the product used in the formulation and are not the amounts based on the weight of actives present. Tektamer 38AD is a preservative, 1,2-dicyano-1,2-dibromobutane (from Calgon).

Example 1

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide (Ecoteric AS10)	8.00
SAS	12.00
SLS	3.10
1,2-dibromo-1,2-dicyanobutane	0.08
Phenoxyethanol	0.10
Citric acid	0.01
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	1.60
Water	74.71
	100.00

The pH of the composition is 7.2

Example 2

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide (Glucapon 600 CSUP)	8.00
SAS	12.00
SLS	3.10
1,2-dibromo-1,2-dicyanobutane	0.08
Phenoxyethanol	0.10
Citric acid	0.01
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	1.60
Water	74.71
	100.00

The pH of the composition is 6.4

Examples 3 and 4

The following compositions are made up.

	Example 3	Example 4
Ingredients	% w/w	% w/w
Alkyl polysaccharide	8.00	8.00
ALS	48.10	55.00
1,2-dibromo-1,2-dicyano butane	0.10	0.10
Phenoxyethanol	0.50	0.50
Sodium citrate	0.10	0.10
Perfume	0.30	0.30
Sodium chloride	0.20	0.20
Water	42.70	35.80
	100.00	100.00

The pH of the compositions of both Examples is 5.4

Examples 5 and 6

The following compositions are made up.

	Example 5	Example 6
Ingredients	% w/w	% w/w
Alkyl polysaccharide	12.00	8.00
AOS	4.65	3.10
SLES	25.20	16.80
1,2-dibromo-1,2-dicyano butane	0.08	0.08
Phenoxyethanol	0.50	0.50
Sodium citrate	0.10	0.10
Perfume	0.30	0.30
Sodium chloride	0.60.	1.40
Water	56.57	69.72
	100.00	100.00

The pH of the compositions of both Examples is 5.8.

Example 7

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	16.00
AOS	4.65
SLES	25.20
1,2-dibromo-1,2-dicyano butane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.1
Perfume	0.30
Sodium chloride	0.17
Water	53.00
	100.00

The pH of the composition of Example 7 is 5.4.

Example 8

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	12.00
SLES	25.20
SAS	4.75
Tektamer 38AD	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	1.16
Water	56.00
	100.00

The pH of the composition is 6.3.

Example 9

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	16.00
SLES	10.00
AOS	16.13
SLS	5.77
1,2-dibromo-1,2-dicyano butane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	0.50
Water	50.62
	100.00

The pH of the composition is 5.5

Example 10

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	16.00
AOS	23.25
SLS	6.20
1, 2-dibromo-1,2-dicyano butane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	0.57
Water	53.00
	100.00

The pH: of the composition is 6.0.

Example 11

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	16.00
AOS	23.50
SLS	5.77
1,2-dibromo-1,2-dicyano butane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Water	53.00
	100.00

The pH of the composition is 6.3

Examples 12 and 13

The following compositions are made up.

	EXAMPLE 12	EXAMPLE 13
Ingredients	% w/w	% w/w
Alkyl polysaccharide	16.00	16.00
SAS	24.00	36.00
SLS	5.77	8.66
1,2-dibromo-1,2-dicyano butane	0.08	0.08
Phenoxyethanol	0.50	0.50
Sodium citrate	0.10	0.10
Perfume	0.30	0.30
Water	53.25	38.36
	100.00	100.00

The pH of both compositions is 6.9

EXAMPLE 14

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	12.00
SLES	25.20
Alpha olefin sulphonate	4.65
1,2-dibromo-1,2-dicyano butane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium Chloride	0.50
Water	56.67
	100.00

The pH of the composition is 5.9.

EXAMPLE 15

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	8.00
ALS	48.10
1,2-dibromo-1,2-dicyano butane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Ammonium chloride	0.20
Water	42.72
	100.00

The pH of the composition is 5.5.

EXAMPLE 16

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	8.00
Ammonium lauryl sulphate	38.50
SLS	3.10
1,2-dibromo-1,2-dicyanobutane	0.08
Phenoxyethanol	0.10
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	0.20
Water	49.62
	100.00

The pH of the composition is 5.7.

EXAMPLE 17

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	8.00
ALS	9.79
SLS	12.00
Phenoxyethanol	0.10
1,2-dibromo-1,2-dicyanobutane	0.08
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	1.4
Water	68.23
	100.00

The pH of the composition is 8.1.

EXAMPLE 18

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	8.00
SLS	15.55
1,2-dibromo-1,2-dicyanobutane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	0.73
Water	74.74
	100.00

The pH of the composition is 6.6.

EXAMPLE 19

The following composition is made up.

Ingredients	% w/w
Alkyl polysaccharide	8.00
SLES	16.80
1,2-dibromo-1,2-dicyanobutane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	1.40
Water	69.72
	100.00

The pH of the composition is 7.2

EXAMPLE 20

Ingredients	% w/w
Alkyl polysaccharide	8.00
SLES	16.80
SLS	3.10
1,2-dibromo-1,2-dicyanobutane	0.08
Phenoxyethanol	0.50
Sodium citrate	0.10
Perfume	0.30
Sodium chloride	1.00
Water	70.12
	100.00

The pH of the composition is 6.5.

Examples 3 to 20 can be repeated using Plantaren 600 CSUP as the alkyl polysaccharide in place of the Ecoteric AS10 .

The dishwashing performance of these Examples is evaluated according to the test procedure set out below.

Method for Evaluating Dishwashing Liquid Performance

Three parameters can be used in this determination:

1. How long is the time until half the foam generated disappears
2. How long is the time until grease can be seen in the water surface.
3. The detergent's grease cutting efficiency.

Soiling Mixture

The composition of the soiling mixture is as follows.

100g plain flour
50g sugar
100g margarine
200ml water
1 egg

All ingredients are mixed well, using a hand held mix master.

Method

1. Make sure all plates are completely dry and free of grease
2. Apply 6g of the soiling mixture onto each plate so that the whole surface of the plate is covered.
3. Leave the soiled plates to stand for one hour.
4. * Weigh 5g of the detergent (i.e. one of the compositions of Examples 1 to 20) (2.5g of concentrate) into a cap.
5. Put the cap into a 5L beaker.
6. Adjust the water flow temperature to 46°C - 50°C.
7. Pour the water onto the cap so that foam is produced. Fill the beaker to 5L and pour into washing bowl.
8. Rinse the beaker with water, using two x 1L and pour into the washing bowl.
9. Dip each plate wholly into the water.
10. Clean each plate with a brush, with the plate 3/4 into the water, 3 times around with the brush on each

surface, and dip wholly into the water again.

11. When all the foam is gone from the surface of the water, record the number of plates washed up at that point - foam lasting.

12. After all the plates have been washed, rinse with water and allow to dry completely.

13. To check the grease cutting efficiency of the detergent, run a clean finger on the surface of a plate. If no smears are visible under a strong light, the plate has had all the greased removed. The first plate that has smears visible, indicates the end of the detergent's grease cutting and is recorded.

The performance of these Examples, compared with a number of currently available products is set out below.

Plates Washed

Example	Foam End Point	Grease End Point
1	29	8
2	21	9
3	19	11
4	22	13
5	26	13
6	23	11
7	26	11
8	24	10
9	30	12
10	27	11
11	21	11
12*	21	14
14*	26	11
15*	24	12
16*	23	11
17*	21	10.5
18*	19	8
19*	23.5	13
20	22	10

All examples determined using hard water, water hardness = 52ppm * = 2.5g sample size

Claims

1. A liquid dishwashing composition, having a pH of from 5.0-8.3, comprising:
   i) 5-42% w/w of one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate, sodium lauryl sulphate and ammonium lauryl sulphate (hereinafter defined as component i) and
   ii) 4-8% w/w of alkyl polysaccharide (hereinafter defined as component ii);
   provided that when sodium lauryl ethoxy sulphate and olefin sulphonate and/or sodium lauryl sulphate are present in component i) the weight ratio of sodium lauryl ethoxy sulphate to olefin sulphonate and/or sodium lauryl sulphate is from 4:1 to 1:4:
   all percentages of components i) and ii) being by weight of actives present.

2. A composition according to Claim 1 in which the pH is 5.5-7.5.

3. A composition according to Claim 1 or Claim 2 in which the pH is 5.5 to 7.2.

4. A composition according to any one of the preceding claims in which the pH is 5.5-6.5.

5. A composition according to any one of the preceding claims in which component i) is present in an amount of 5-36%.

6. A composition according to any one of the preceding claims in which component i) is present in an amount of 10-25%.

7. A composition according to any one of Claims 1 to 4 in which component i) is selected from 5.6-42% w/w of one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate and sodium lauryl sulphate, these surfactants being alone or together with ammonium lauryl sulphate as an optional additional component.

8. A composition according to Claim 7 in which two or more surfactants are present in component i).

9. A composition according to Claim 7 or Claim 8 in which component i) is present in an amount of 5.6 to 36%.

10. A composition according to any one of Claims 1 to 4 in which component i) is selected from ammonium lauryl sulphate, alone or together with one or more surfactants selected from sodium lauryl ethoxy sulphate, an olefin sulphonate, an alkane sulphonate and sodium lauryl sulphate as optional components.

11. A composition according to Claim 10 in which component i) is present in an amount of 5 to 20%.

12. A composition according to Claim 10 or Claim 11 in which component i) is present in an amount of 10-15%.

13. A composition according to Claim 10 in which component i) is present in an amount of 12-15%.

14. A liquid dishwashing composition having a pH of from 5.0-8.3 and comprising:
   i) 2.8-18% w/w sodium lauryl ethoxy sulphate; and/or
   ii) 2.8-18% w/w of olefin sulphonate, sodium lauryl sulphate or mixtures thereof; and
   iii) 4.8% w/w of alkyl polysaccharide,
   provided that the weight ratio of sodium lauryl ethoxy sulphate to olefin sulphonate, sodium lauryl sulphate or mixtures thereof is from 4:1 to 1:4.

15. A liquid dishwashing composition having a pH of from 5.0-8.3 and comprising
   i) 5-20% w/w of ammonium lauryl sulphate
   ii) 4-8% w/w of alkyl polysaccharide.

16. A composition according to any one of the preceding claims containing one or more of the following
   a) 0 to 2% w/w of sodium citrate and/or citric acid,

b) 0 to 2% w/w of ammonium chloride, potassium chloride and sodium chloride
c) 0 to 1% w/w of a preservative selected from phenoxyethanol and 1,2-dibromo-1,2-dicyanobutane,
d) 0 to 1% of perfumes and
e) 0 to 1% of dyes.