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(71) Applicant: **Cares Laboratory Limited**
Barnsley, Yorkshire S75 3SP (GB)

(72) Inventors:
- **ABBEY, Thomas James**
  Leeds, Yorkshire LS24 9LR (GB)
- **TOMS, David John**
  Bromley, Kent BR6 9FB (GB)
- **BUTCHER, Alex Georgia**
  Sheffield, Yorkshire S75 5LB (GB)

(74) Representative: **Sewell, Adrian David**
Tandem Patents Limited
Grange Farm
Wetherby Road
Little Ribston
Wetherby LS22 4EP (GB)

Remarks:
Claims17,18,21,22,23 and 26 are deemed to be abandoneddue to non-payment of the claims fees(Rule 45(3)EPC).

(54) HAIR REMOVAL FROM TEXTILES

(57) The present invention provides a composition for use in a washing apparatus to remove hair on a textile material, comprising a non-chlorine-based bleaching agent and a bleach activator, wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1. A use and method of removing hair on a textile material are also provided.

Ingredient	%	Function
Sodium carbonate anhydrous	43.95	alkali
sodium percarbonate 88% / 12% sodium carbonate	45.00	bleach
TAED	10.00	activator
Precipitated silica	1.00	free flow agent
Perfume	0.05	fragrance

Figure 2

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Description

[0001] The present invention relates to a composition for removing hair from a textile material. In particular, but not exclusively, the present invention relates to a composition for removing pet hair from pet bedding or the like and from a washing machine used to wash the pet bedding.

[0002] The number of pet owners in the United Kingdom is growing. Recent research indicates that there are currently around 9 million pet dogs and around 8 million pet cats in the UK. A majority of these pets shed hair without seasonality and many pet owners allow their pets to sit on the sofa and/or sleep on the bed. This undesirably results in pet hair being left on the owner's bedding, blankets, sofa covers, and the like. In an attempt to control this problem, many pet owners regularly groom their pets either themselves or by an independent groomer which is undesirably costly. Many use lint rollers to remove pet hair from clothing and expensive vacuum cleaners to remove pet hair from sofas etc. However, the problem of pet hair around the home and on clothing remains resulting in excessive washing and drying of clothing, owner and pet bedding, blankets, seat and sofa covers, or the like, which undesirably uses significant amounts of energy, is time consuming and costly, environmentally unfriendly, and adversely compromises the fabric itself. Furthermore, pet hair is never fully removed from a pet's bedding or blanket by laundering, for example, and also remains in the washing machine and tumble dryer to contaminate the same, typically around the door seal, and subsequent clothing being washed therein, and which may undesirably compromise the operation of the machine.

[0003] It is an aim of certain embodiments of the present invention to provide a composition for use in a washing machine that removes pet hair from a textile material, such as a pet blanket or bed cover, and which leaves the washing machine clean and free from stray hairs.

[0004] It is an aim of certain embodiments of the present invention to provide a composition for use in a washing machine that removes at least around 40% of pet hair from a textile material, such as a pet blanket or bed cover, at aptly at least 80%.

[0005] It is an aim of certain embodiments of the present invention to provide a composition for use in a washing machine that removes odours from a textile material, such as a pet blanket or bed cover, and the washing machine, and which leaves the same hygienically clean.

[0006] It is an aim of certain embodiments of the present invention to provide a composition for use in a washing machine that removes pet hair from a textile material, such as a pet blanket or bed cover, whilst not adversely affecting the textile material or the machine.

[0007] It is an aim of certain embodiments of the present invention to provide a composition for use in a washing machine that removes pet hair from a textile material, such as a pet blanket or bed cover, and which requires less energy and is environmentally friendly.

[0008] It is an aim of certain embodiments of the present invention to provide a method of removing hair from a textile material in an efficient, convenient, cost effective, safe and environmentally friendly manner, by aptly using a conventional washing machine.

[0009] It is an aim of certain embodiments of the present invention to provide a method of manufacturing a composition for use in a washing apparatus to dissolve hair on a textile material.

[0010] According to a first aspect of the present invention there is provided a composition for use in a washing apparatus to remove hair on a textile material, comprising:

a non-chlorine-based bleaching agent; and
a bleach activator;
wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1

[0011] Optionally, the ratio is from around 20:1 to around 3.5:1.

[0012] Optionally, the ratio is around 4:1.

[0013] Optionally, the bleaching agent is between around 10-80% by weight and the bleach activator is between around 0.5-50% by weight.

[0014] Optionally, the bleaching agent is around 40% by weight and the bleach activator is around 10% by weight.

[0015] Optionally, the bleaching agent comprises an inorganic peroxide bleach.

[0016] Optionally, the bleaching agent comprises any one or more of sodium percarbonate, sodium perborate, sodium persulphate, potassium persulphate, ammonium persulphate, or the like.

[0017] Optionally, the bleaching agent is mixed with a salt. Optionally, the salt comprises sodium carbonate.

[0018] Optionally, the mixture comprises around 80-90% by weight of the sodium percarbonate and around 10-20% by weight of the sodium carbonate.

[0019] Optionally, the bleach activator comprises any one or more of tetraacetylethylenediamine (TAED), sodium nonanoyloxybenzenesulfonate (NOBS), manganese oxalate, Mn(Byclam)CI2, DECOBS (4-(2-decanoyloxyethoxycarbonyloxy) benzenenesulfonatesodium), Tinocat® TRS KB2 (BASF), decanoyloxybenzoicacid (DOBA), lauroyloxybenze-

nesulfonatesodium (LOBS), or the like.

[0020] Optionally, the bleach activator comprises TAED.

[0021] Optionally, the composition further comprises sodium carbonate anhydrous.

[0022] Optionally, the sodium carbonate anhydrous is around 0-75%, aptly around 45%, by weight.

[0023] Optionally, the composition comprises a mixture of the sodium carbonate anhydrous and a further alkali.

[0024] Optionally, the further alkali is sodium metasilicate.

[0025] Optionally, the composition further comprises any one or more of a water softening agent, a surfactant, a soap, a perfume, an enzyme, a fabric softening agent, a hydrotope, and a free flow agent.

[0026] Optionally, the free flow agent comprises precipitated silica.

[0027] Optionally, the composition is in powder form.

[0028] According to a second aspect of the present invention there is provided a use of a composition according to the first aspect of the present invention in a washing apparatus to remove hair on a textile material.

[0029] According to a third aspect of the present invention there is provided a method of removing hair on a textile material, comprising:

in a washing apparatus, wetting a textile material having hair disposed thereon with a predetermined volume of water at a predetermined temperature; and
introducing a predetermined amount of a composition to the water to dissolve the hair, the composition comprising a non-chlorine-based bleaching agent and a bleach activator;
wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1.

[0030] Optionally, the method further comprises agitating the textile in the water.

[0031] Optionally, the method further comprises introducing the predetermined amount of the composition in powder form into a drum or a detergent dispenser of a washing machine.

[0032] Optionally, the predetermined temperature of the water is around 60 to 95°C.

[0033] Optionally, the predetermined amount of the composition is equivalent to around 6g-40g/litre, aptly around 10-25g/litre, and aptly around 12g/litre, based on a volume of the water.

[0034] According to a fourth aspect of the present invention there is provided a method of manufacturing a composition for use in a washing apparatus to remove hair on a textile material, comprising the step of:

mixing a non-chlorine-based bleaching agent and a bleach activator,
wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1

[0035] Optionally, the bleaching agent and bleach activator are in powder form.

Description of the Drawings

[0036] Certain embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1a illustrates the chemical reaction that occurs when sodium percarbonate is dissolved in water;

Figure 1b illustrates the chemical reaction between tetraacetylethylenediamine (TAED) and hydrogen peroxide;

Figure 2 illustrates the ingredients of a composition according to certain embodiments of the present invention;

Figure 3 illustrates a set of test results according to certain embodiments of the present invention; and

Figures 4 and 5 further illustrate the results of Figure 3.

Detailed Description

[0037] The primary component of hair fibre is keratin. Keratins are proteins, long chains (polymers) of amino acids. Keratin proteins form the cytoskeleton (miniature skeleton within a cell) of all epidermal cells. Keratin filaments run within a cell from the inside of the outer membrane to weave a 'basket' around the nucleus of the cell. Keratin accounts for 30% of the cellular protein of living epidermal cells and 85% of cellular protein of the dead cells in the stratum corneum (the scaly, dead or horny layer of the outer skin). In hair fibre, keratin proteins comprise 65-95% of the total hair fibre by weight. There are several subtypes of keratin proteins, some are called 'soft' keratins and others are 'hard' keratins.

Soft keratins are found in the skin and are relatively easy to break down whereas hard keratins are very resistant to degradation. Hard keratins do not dissolve in water and they are highly resistant to proteolytic enzymes. Hair fibre is mostly made from hard keratin proteins.

[0038] Hair contains a high amount of sulphur because the amino acid cysteine is a key component of the keratin proteins in hair fibre. The sulphur in cysteine molecules in adjacent keratin proteins link together in disulphide chemical bonds. These disulphide bonds are very strong and very difficult to break apart. These disulphide chemical bonds linking the keratins together are the key factor in the durability and resistance of hair fibre to degradation under environmental stress. They are largely resistant to the action of acids but the disulphide bonds can be broken apart by alkali solutions. This property is exploited in perms and chemical hair straightening processes. Alkali is used to break the disulphide bonds in the keratins and make the hair weak. The hair is formed into a new shape and then acid is applied to neutralize the alkali and enable the disulphide bonds to reform. The reformed disulphide bonds hold the hair in its new shape.

[0039] In accordance with certain embodiments of the present invention, a composition for dissolving hair (from a human and/or animal) and thus removing the same from textiles, such as clothing, blankets, bedding or the like, has been formulated for use in a washing apparatus such as a washing machine. An example of the constituents of the composition is shown in Figure 2. The sodium carbonate anhydrous is an alkali which is used to break the disulphide bonds in the keratins and weaken the hair. Sodium carbonate is aptly used because it is relatively safe, plentiful and inexpensive, but other suitable alkalis, or mixtures of alkalis, either without or without sodium carbonate, may be used to provide a solution of a certain pH, such as greater than around pH 8.0 and aptly around pH 9.0 -11.5. For example, the sodium carbonate anhydrous may aptly be mixed with sodium metasilicate, or the like. The selected concentration of sodium carbonate anhydrous is around 0-75% (it may not be necessary to add any sodium carbonate, or other suitable alkali such as sodium hydroxide, sodium silicate, sodium metasilicate, potassium carbonate, because there may be sodium carbonate mixed with the sodium percarbonate as described further below) and aptly around 45%, which has been found to help efficiently break down and dissolve the hair.

[0040] The composition further includes a mixture of sodium percarbonate and sodium carbonate wherein the mixture is around 10-80% of the composition, aptly around 45%, and wherein the sodium percarbonate is around 88% of the mixture and the sodium carbonate is around 12% of the mixture. The sodium percarbonate is a non-chlorine-based bleaching agent and is relatively non-hazardous, plentiful and inexpensive. Other suitable non-chlorine-based bleaching agents may include sodium perborate, sodium persulphate, potassium persulphate, ammonium persulphate, or the like. Oxidising agents, such as inorganic peroxides or chlorine-based bleaching agents such as sodium hypochlorite, oxidise the disulphide bond in the keratin causing the bond to break permanently, breaking up and ultimately dissolving the hair

[0041] Unlike chlorine-based bleaching agents, a non-chlorine-based bleaching agent is safer to use in respect of a person laundering the textile, e.g. operating a washing machine and handling the composition, and/or handling/contacting clothing or bedding that has been washed using the composition. It is also safer in respect of an animal using bedding for example which has been washed using the composition. Furthermore, the non-chlorine-based bleaching agent is non-corrosive to metals so will not adversely affect/damage the drum of a washing machine, and is also kinder on the textile being washed in terms of at least not adversely affecting the integrity and colour of the textile.

[0042] The composition further includes TAED which is a bleach activator. The concentration of TAED in the composition is around 0.5-50% and aptly around 10%. Other suitable bleach activators may include sodium nonanoyloxybenzenesulfonate (NOBS), manganese oxalate, Mn(Byclam)Cl2, DECOBS (4-(2-decanoyloxyethoxycarbonyloxy) benzenesulfonatesodium), Tinocat® TRS KB2 (BASF), decanoyloxybenzoicacid (DOBA), lauroyloxybenzenesulfonatesodium (LOBS), or the like.

[0043] The composition optionally further includes precipitated silica at around 1% concentration which is a free flow agent to prevent powder 'cakes' forming and to improve the shelf life of the product. The composition may also include a perfume at a concentration of around 0.05% to provide a desired fragrant to the powder composition.

[0044] As illustrated in Figure 1a, the sodium percarbonate forms hydrogen peroxide when dissolved in water.

[0045] In the presence of a bleach activator, such as tetraacetylethylenediamine (TAED) or the like, the hydrogen peroxide is converted to peracetic acid as shown in Figure 1b.

[0046] In accordance with certain embodiments of the present invention, a number of bench tests were carried out on a scaled down basis relative to a washing machine so that the amount of hair remaining after treatment can be captured and measured for different concentration ratios of sodium percarbonate to TAED. An average washing machine capacity (average volume of water introduced during a wash cycle) of around 8.3 litres was scaled down to a beaker containing 500ml of water at around 85°C. 6g of the composition in powder form (which is the equivalent of introducing 100g of powder composition into a washing machine cycle) was added to the water in the beaker. 0.5g of human hair was accurately weighed and added to the beaker. The solution was then magnetically stirred at 300rpm for 30 minutes. The solution was then filtered with a vacuum/Buchner funnel to capture any undissolved hair. This was then dried for 2 hours at around 50°C and weighed after 5 minutes. The slight delay before weighing was to allow the moisture content to equalise at room temperature giving a direct comparison with the weight before treatment, otherwise the weight of any captured hair could be lower just because it had come straight out of the oven and contained less moisture than the hair

before treatment. The percentage change of the weight of hair before and after the test was calculated using the following equation:

$$100 - \left(\frac{\text{(Final weight of hair)} \times 100}{\text{(original weight of hair)}} \right) \quad (1)$$

[0047] The test was repeated for different concentration ratios of sodium percarbonate to TAED.

[0048] The composition in accordance with the present invention for the purposes of the tests was made up of sodium carbonate anhydrous, sodium percarbonate mixture, Mykon™ ATC Blue (TAED) and salt. The amounts of sodium carbonate anhydrous and salt were adjusted according to the ratio of sodium percarbonate to TAED for each respective test composition.

[0049] As shown in Figure 3, in accordance with certain embodiments of the present invention, it has been found that a composition having a non-chlorine-based bleaching agent to bleach activator, e.g. sodium percarbonate to TAED, concentration ratio of around 40:1 to around 3.3:1, and aptly around 20:1 to around 3.5:1, and aptly around 4:1, has a significant and desirable technical effect on dissolving hair and thus removing the same from a textile. A similar test was carried out using two conventional in-wash stain removers (Oxi-Power Whites™ and Oxi-Power Colours™ both available from Tesco™ pic.) which the manufacturer indicates as having a sodium percarbonate to TAED concentration ratio of 50:1 and 80:1 respectively. The hair removal results for these two conventional products when carrying out the 100g test in accordance with certain embodiments of the present invention were only 6% and 8% respectively. Further tests for the 100g equivalent test composition using smaller increments of the sodium percarbonate to TAED concentration ratio were also carried out and the results are further illustrated in Figures 4 and 5.

[0050] Furthermore, to demonstrate the significant and desirable performance results compared to the abovementioned known stain removers for different amounts of the composition, and thus different concentrations depending on the volume of water in the washing apparatus, e.g. capacity of washing machine drum, further tests were performed with test compositions equivalent to 50g, 75g, 125g and 200g in an average washing machine cycle (around 6g/litre, 9g/litre, 15g/litre and 24g/litre respectively) having a bleaching agent: bleach activator concentration ratio of 4:1. The results of these additional tests were 22%, 48%, 38% and 30% respectively. Whilst increased performance of hair removal was identified across the range of different quantities/concentrations, it was found that an amount of the composition equivalent to 100g in an average washing machine cycle (around 12g/litre based on the volume of water introduced during an average washing cycle being around 8.3 litres) performed best when compared to the test compositions equivalent to around 6g/litre, 9g/litre, 15g/litre and 24g/litre. Requiring 100g of powder composition in accordance with certain embodiments of the present as opposed to 150g or 200g for example is also desirable in terms of cost and environmental impact and the like. It was also found that the desirable performance of the composition in accordance with certain embodiments of the present invention occurred at a water temperature of around 60-95°C, and aptly around 75-95°C.

[0051] In use, clothing, home fabrics, pet bedding or blankets or the like is placed in the drum of a conventional washing machine. Via a scoop, 100g of the composition according to certain embodiments of the present invention and in powder form is placed in the drum or tray/drawer and optionally along with a conventional washing detergent. The washing machine is run on its longest and hottest cycle, aptly around 85-95°C for around 60-120minutes. When the washing cycle has finished, the textile is removed from the washing machine and dried in a suitable manner, e.g. in a tumble dryer. In accordance with certain embodiments of the present invention, a major portion, aptly at least 60%, and more aptly at least 80%, of the hairs previously disposed on the textile will have been dissolved and removed therefrom and will also have been removed from the drum of the washing machine with the soiled water during the drain cycle to thereby leave the textile and the washing machine clean and hair and odour free.

[0052] To manufacture the composition for a laboratory sample according to certain embodiments of the present invention, the following steps are performed:

weigh a required amount of each powder ingredient as per a desired formula and, in particular, a desired concentration ratio of sodium percarbonate to TAED;
add the powder ingredients in optionally the following order to a container and mix for a predetermined time, such as a few seconds, after the addition of the second ingredient and each subsequent ingredient using a suitable stirrer such as a spatula:

a) Sodium carbonate;
b) Sodium percarbonate;
c) TAED; and
d) Precipitated silica; and

optionally add the perfume liquid and stir for a predetermined time, such as at least 60 seconds.

[0053] In accordance with certain embodiments of the present invention, the composition, use and method are suitable for many different technical applications and capacity of washing apparatus/volume of water being introduced therein. For example, the method could readily be scaled up to an industrial powder blending process and the composition could be prepared in a desired concentration, such as between around 6g/litre to around 40g/litre, aptly between around 10-25g/litre, and preferably 12g/litre to suit many different applications domestic and industrial applications and capacity of washing apparatus/volume of water being introduced therein.

[0054] Certain embodiments of the present invention therefore provide a composition in powder form for use in washing machine to remove the majority of hairs disposed on a textile or fabric material, such as clothing, bedding or the like, in a safe, efficient, cost effective and environmentally friendly manner. Furthermore, the composition does not corrode or adversely affect the washing machine or textile itself and is suitable for use in a wash cycle of a washing machine. The composition leaves the vessel being used for the laundering process, such as a domestic washing machine, clean and free from hair and odour.

Claims

1. A composition for use in a washing apparatus to remove hair on a textile material, comprising:

   a non-chlorine-based bleaching agent; and
   a bleach activator;
   wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1

2. The composition as claimed in claim 1, wherein the ratio is from around 20:1 to around 3.5:1.

3. The composition as claimed in claim 1 or 2, wherein the ratio is around 4:1.

4. The composition as claimed in any preceding claim, wherein the bleaching agent is between around 10-80% by weight and the bleach activator is between around 0.5-50% by weight.

5. The composition as claimed in claim 4, wherein the bleaching agent is around 40% by weight and the bleach activator is around 10% by weight.

6. The composition as claimed in any preceding claim, wherein the bleaching agent comprises an inorganic peroxide bleach.

7. The composition as claimed in claim 6, wherein the bleaching agent comprises any one or more of sodium percarbonate, sodium perborate, sodium persulphate, potassium persulphate, ammonium persulphate, or the like.

8. The composition as claimed in claim 7, wherein the bleaching agent comprises a mixture of sodium percarbonate and sodium carbonate.

9. The composition as claimed in claim 8, wherein the mixture comprises around 80-90% by weight of the sodium percarbonate and around 10-20% by weight of the sodium carbonate.

10. The composition as claimed in any preceding claim, wherein the bleach activator comprises any one or more of tetraacetylethylenediamine (TAED), sodium nonanoyloxybenzenesulfonate (NOBS), manganese oxalate, Mn(Byclam)CI2, DECOBS (4-(2-decanoyloxyethoxycarbonyloxy) benzenenesulfonatesodium), Tinocat® TRS KB2 (BASF), decanoyloxybenzoicacid (DOBA), lauroyloxybenzenesulfonatesodium (LOBS), or the like.

11. The composition as claimed in claim 10, wherein the bleach activator comprises TAED.

12. The composition as claimed in any preceding claim, further comprising sodium carbonate anhydrous.

13. The composition as claimed in claim 12, wherein the sodium carbonate anhydrous is around 0-75% by weight.

14. The composition as claimed in claim 12 or 13, comprising a mixture of the sodium carbonate anhydrous and a further

alkali.

15. The composition as claimed in claim 14, wherein the further alkali is sodium metasilicate.

16. The composition as claimed in any preceding claim, further comprising any one or more of a water softening agent, a surfactant, a soap, a perfume, an enzyme, a fabric softening agent, a hydrotope, and a free flow agent.

17. The composition as claimed in claim 16, wherein the free flow agent comprises precipitated silica.

18. The composition as claimed in any preceding claim, wherein the composition is in powder form.

19. Use of a composition as claimed in any preceding claim in a washing apparatus to remove hair on a textile material.

20. A method of removing hair on a textile material, comprising:

in a washing apparatus, wetting a textile material having hair disposed thereon with a predetermined volume of water at a predetermined temperature; and
introducing a predetermined amount of a composition to the water to dissolve the hair, the composition comprising a non-chlorine-based bleaching agent and a bleach activator;
wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1.

21. The method as claimed in claim 20, further comprising agitating the textile in the water.

22. The method as claimed in claim 20 or 21, further comprising introducing the predetermined amount of the composition in powder form into a drum or a detergent dispenser of a washing machine.

23. The method as claimed in any of claims 20 to 22, wherein the predetermined temperature of the water is around 60 to 95°C.

24. The method as claimed in any of claims 20 to 23, wherein the predetermined amount of the composition is equivalent to around 6-40g/litre based on a volume of the water.

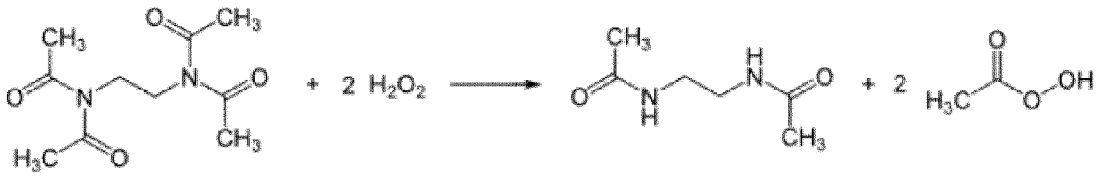
25. A method of manufacturing a composition for use in a washing apparatus to remove hair on a textile material, comprising the step of:

mixing a non-chlorine-based bleaching agent and a bleach activator, wherein a concentration ratio of the bleaching agent to the bleach activator is from around 40:1 to around 3.3:1

26. The method as claimed in claim 25, wherein the bleaching agent and bleach activator are in powder form.

$$2\ Na_2CO_3 \cdot 3\ H_2O_2 \rightarrow 2\ Na_2CO_3 + 3\ H_2O_2$$

Figure 1a



TAED | Hydrogen Peroxide | DAED (N,N-diacetylethylenediamine) | Peracetic acid (oxidising agent)

Figure 1b

Ingredient	%	Function
Sodium carbonate anhydrous	43.95	alkali
sodium percarbonate 88% / 12% sodium carbonate	45.00	bleach
TAED	10.00	activator
Precipitated silica	1.00	free flow agent
Perfume	0.05	fragrance

Figure 2

Percarbonate / TAED ratio	% hair removal - 100g powder (12g/l)
2:1	20
3:1	25
3.1:1	16
3.2:1	22
3.3:1	48
3.5:1	66
3.7:1	76
4:1	93
4.2:1	74
7:1	69
20:1	63
40:1	43

Figure 3

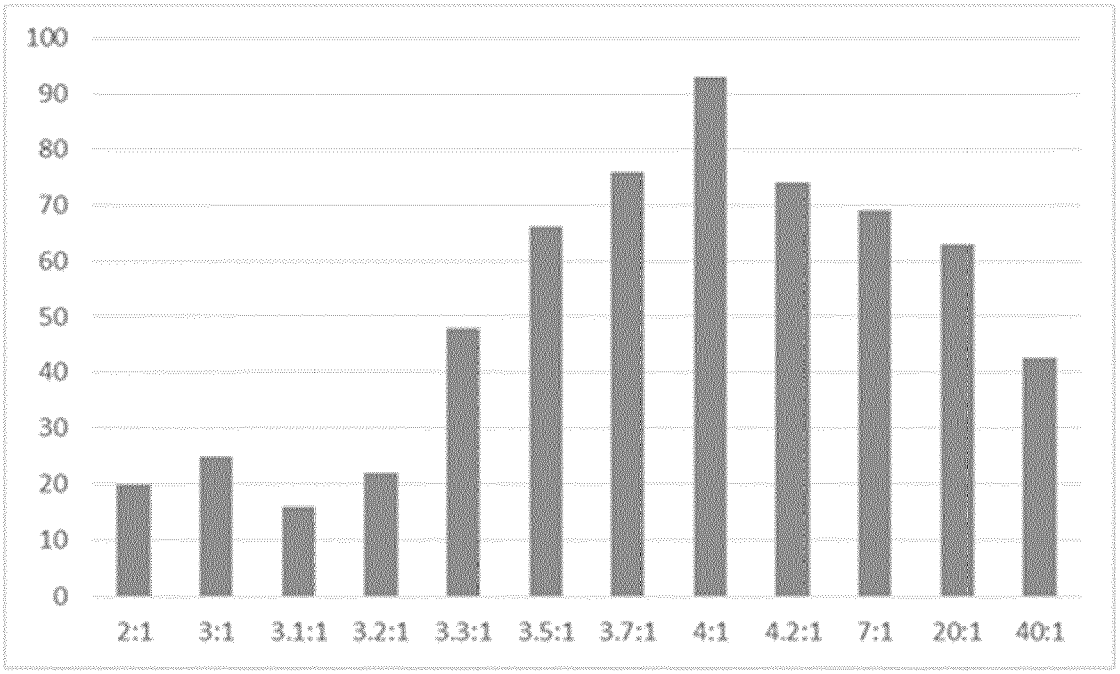


Figure 4

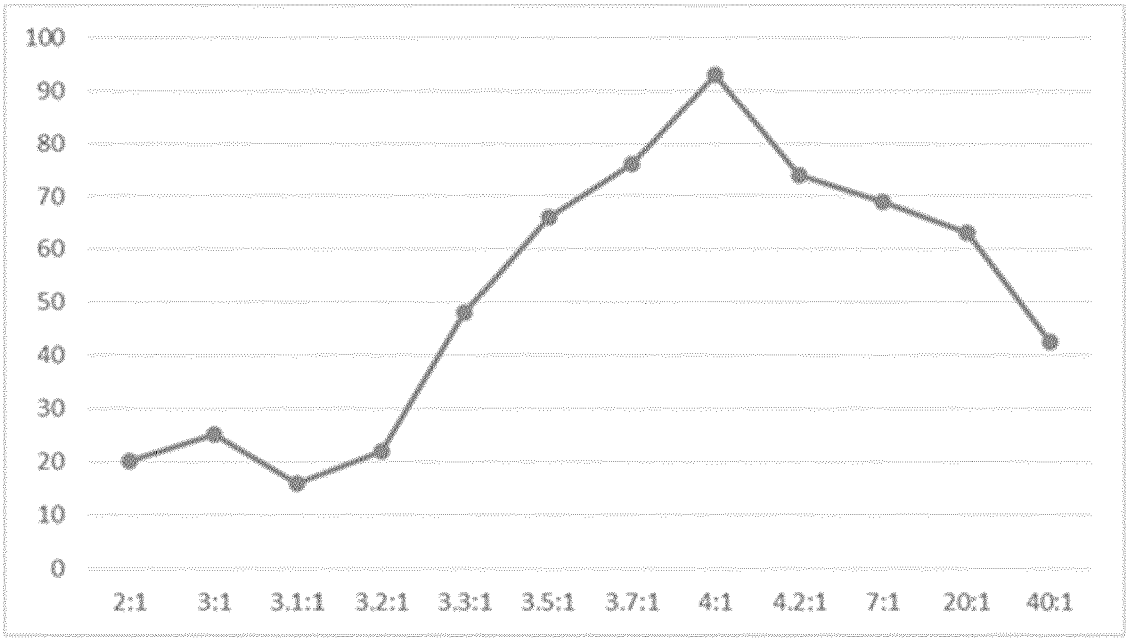


Figure 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 15 2266

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 97/34979 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]) 25 September 1997 (1997-09-25) * examples 6,7,8 *	1-4,6-8, 10-16,25	INV. C11D3/39
X	WO 2014/090573 A1 (UNILEVER NV [NL]; UNILEVER PLC [GB]; CONOPCO INC DBA UNILEVER [US]) 19 June 2014 (2014-06-19) * examples 1,2; table 1 *	1-4,6-8, 10-16,25	
X	EP 0 481 792 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]) 22 April 1992 (1992-04-22) * page 14; examples 14-18 *	1,2,4, 6-8, 10-16	
A	US 2014/137339 A1 (BURNET RICHARD JOHN STACEY [GB] ET AL) 22 May 2014 (2014-05-22) * claims 1-20 *	1-16,19, 20,24,25	
A	JP 2013 023650 A (DAI ICHI KOGYO SEIYAKU CO LTD) 4 February 2013 (2013-02-04) * claims 1-3 *	1-16,19, 20,24,25	TECHNICAL FIELDS SEARCHED (IPC) C11D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 September 2018	Richards, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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European Patent Office
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Application Number
EP 18 15 2266

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

[X] Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

16, 19, 20, 24, 25

[ ] No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

[ ] All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

[ ] As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

[ ] Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

[ ] None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

[ ] The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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