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(54) **Oven cleaner.**

(57) An oven cleaner containing as the active ingredients a non-caustic alkali metal carbonate, sesquicarbonate or bicarbonate and a polyhydric alcohol, preferably glycerol, which is liquid and substantially non-volatile at the desired cleaning temperature and in which the alkali metal salt is soluble at that temperature.

A method for cleaning ovens and cookware comprises applying the oven cleaner according to the invention to the surface to be cleaned and heating the surface to a temperature of at least 125°C for a period of at least five minutes and wiping and/or washing the saponified oils and fats from the surfaces.

Effective oven cleaning compositions having a pH of 9 or below may be produced using the present invention.

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DESCRIPTION

The present invention relates to an improved oven cleaner and to a method for removing baked on fats and greases from cooking surfaces.

Oven cleaners are compositions of matter used to remove baked on fats and greases from cooking surfaces. Such compositions are commonly used for cleaning ovens as the name implies but may also be used to clean other cooking surfaces on which there has been a build up of baked on fats and greases. Such surfaces include fry pans, kitchenware, barbecue equipment, cooking utensils and the like. These surfaces may be of bare metal, metal coated as with baked enamel, glazed stoneware, porcelain, glass or the like.

Conventional oven cleaners are based on caustic soda. It has generally been considered necessary to use a caustic alkali in order to effectively saponify the fats in the baked on material in order to enable its removal. A few oven cleaners have been based on solvents, acetate salts, amines or ammonia. The known caustic based systems suffer from the disadvantage of being quite hazardous and/or require the consumer to wear gloves during usage. These known caustic-based systems are required to carry poisons schedule labelling and warning statements. The systems based on acetate salts have the disadvantage that they require temperatures of 250°C or above to activate them.

It has been proposed in the past to individually add organic solvents and inorganic builder salts to oven cleaning compositions based on alkali or nitrogen containing active cleaning ingredients. Such additions are for instance disclosed in U.S. Patent Specifications 3,829,387; 3,813,343; and 3,658,711. It has also been known to use aqueous solutions of alkali metal salts to form non-stick coatings on ovens; see U.K. Patent Specifications 2,019,876 and 1,523,491 (1,576,454) and Australian Patent Specification 453,537. It has not previously been proposed, however, to use the two abovementioned types of ingredients together. It has also

not been previously recognised that these two types of ingredients, which each has only a mild cleaning action on its own, can be combined together to provide a highly effective oven cleaner while avoiding many of the disadvantages of the known oven cleaners.

The present invention consists in an oven cleaner containing as active ingredients an effective amount of an alkali metal bicarbonate, sesquicarbonate or carbonate or a mixture thereof and a polyhydric alcohol which is liquid and substantially non-volatile at the desired cleaning temperature and in which the alkali metal salt is soluble at that temperature.

The present invention further consists in applying the oven cleaner according to this invention to a cooking surface carrying baked on fats or greases, heating the cooking surface to at least 125°C, and preferably from 125 to 250°C, for a period of at least five minutes and washing and/or wiping the saponified fats or greases from the cooking surface.

The oven cleaner according to the present invention may have a pH as low as 9 or less which allows its use without rubber gloves and like protective clothing. These oven cleaners also have the advantage that surfaces of stainless steel, aluminium, and some other metals will be left with a shiny surface after cleaning rather than being left with a dull, oxidised, surface as is the case with many of the prior art oven cleaning compositions.

The non-caustic alkali metal salt is most preferably sodium or potassium bicarbonate. Other alkali metal salts which can be advantageously used include sodium or potassium sesquicarbonate, and sodium or potassium carbonate. The alkaline salt preferably comprise from 0.5 to 20% by weight of the product and most preferably 2 to 20% by weight.

The pH of the product is preferably below 11 and more preferably below 10 and most preferably 9 or below.

The polyhydric alcohol used in the present invention preferably have the general formula:

$CH_2OH \cdot (CHOH)_n \cdot CH_2OH$ where n = 0, 1, 2, 3 or 4.

The liquid is most preferably glycerol or includes glycerol. Other compounds in this group which may be used include mannitol, ethylene glycol and sorbitol. When the salt is a potassium salt the polyhydric alcohol may with equal effectiveness be an alcohol falling outside the above general formula. This is believed to be due to the higher solubility of the potassium salts in the polyols as compared with the corresponding sodium salt. Polyhydric alcohols which work efficiently with the potassium salts include various grades of propylene glycol, diethylene glycol, polyethylene glycol, dipropylene glycol, polypropylene glycol, triethylene glycol, and 1,2,6 hexanetriol. The polyhydric alcohol preferably comprises from 1 to 50% by weight of the product.

The oven cleaner according to this invention preferably includes water. The water is preferably present in an amount of at least 35% by weight.

The oven cleaner is preferably water based and preferably contains a thickener to prevent it running off vertical surfaces. Other ingredients may include a surfactant or soap, a fragrance, a pigment marker and a propellant.

The oven cleaner according to this invention may be applied in any suitable manner. These include an aerosol, a trigger or pump spray, a brush or pad.

In carrying out the method according to this invention the oven cleaner is preferably applied to a surface to be cleaned and heated to a temperature of from 125°C to 250°C for a time of from 5 minutes to 2 hours.

It is believed that oven cleaners according to this invention are effective, despite their limited alkalinity and the evaporation of the water from the cleaner, due to the continued action of the alkaline salt dissolved in the

non-volatile polyhydric alcohol. The alkaline salt is maintained in a condition in which it is available for reaction with the baked on fats and greases at the required elevated temperature by being dissolved in the polyhydric alcohol. For this reason the polyhydric alcohol is required to be substantially non-volatile at the cleaning temperature.

Hereinafter given by way of example are preferred embodiments of the present invention.

Test surfaces were prepared by baking smeared dripping onto white vitreous enamel metal plates for 1 1/2 hours at 250 C. °The baked-on dripping could not be removed at all by washing or wiping without a scourer.

Cleaners consisting of the formulations given below were applied to the test surfaces to be cleaned from a trigger pack after shaking well.

The test plates were then heated in an oven for 30 minutes to a final temperature of 150°C.

The test plates were then either rinsed under a fast running tap or wiped with a damp sponge and the percentage removal of baked-on dripping recorded.

Example 1	% w/w
Sodium Bicarbonate	6.3
Glycerol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	100

Example 2	% w/w
Potassium Bicarbonate	7.5
Glycerol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0

Veegum T		1.5
Xanthan Gum		0.05
Titanium Dioxide		0.5
Water	to	100
Product pH		8.4
% Removal of soil		100

Example 3		% w/w
Soda Ash (Sodium Carbonate)		4.0
Glycerol		20.0
Sodium Dodecyl Benzene Sulphonate		1.0
Veegum T		1.5
Xanthan Gum		0.05
Titanium Dioxide		0.5
Water	to	100
Product pH		11.25
% Removal of soil		100

Example 4		% w/w
Sodium Sesquicarbonate		5.65
Glycerol		20.0
Sodium Dodecyl Benzene Sulphonate		1.0
Veegum T		1.5
Xanthan Gum		0.05
Titanium Dioxide		0.5
Water	to	100
Product pH		10.1
% Removal of soil		100

Example 5	% w/w
Sodium Bicarbonate	3.15
Potassium Bicarbonate	3.75

Glycerol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	100

Note: Use of the bicarbonate mixture gave no improvement in performance at lower temperatures or shorter heating time intervals.

Example 6	% w/w
Sodium Bicarbonate	6.3
Sorbitol (70%)	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	95

Example 7	% w/w
Sodium Bicarbonate	6.3
Ethylene Glycol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4

% Removal of soil	80

Example 8	% w/w
Sodium Bicarbonate	6.3
Mannitol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	92

Example 9	% w/w
Sodium Bicarbonate	6.3
Ethylene Glycol	8.3
Sorbitol (70%)	11.7
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	93

Note: Mixture of ethylene glycol and sorbitol matches glycerol with respect to average chain length.

Example 10

A cleaner consisting of the following formulation was applied to a test surface to be cleaned, prepared as for Examples 1-9, from an aerosol pack after shaking well. The test was then carried out in the same manner as for Examples 1-9.

	% w/w
Sodium Bicarbonate	5.67
Glycerol	18.0
Gafteric MD	0.036
Veegum T	1.35
Xanthan Gum	0.045
Titanium Dioxide	0.45
Deionised Water	64.45
Propellant P12/114:60/40	10.0
Product pH	8.4
% Removal of soil	99

Example 11

A cleaner consisting of the following formulation was brushed onto a test surface to be cleaned, prepared as for Examples 1-9. The test was then carried out in the same manner as for Examples 1-9.

	% w/w
Sodium Bicarbonate	24.0
Glycerol	76.0
% Removal of soil	100

Example 12	% w/w
Potassium Bicarbonate	7.5
Diethylene Glycol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	100

Example 13	% w/w
Potassium Bicarbonate	7.5
Triethylene Glycol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	100

Example 14	% w/w
Potassium Bicarbonate	7.5
Propylene Glycol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	100

Example 15	% w/w
Potassium Bicarbonate	7.5
1,2,6 Hexanetriol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4

% Removal of soil	100

Example 16	% w/w
Potassium Bicarbonate	7.5
Dipropylene Glycol	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	95

Example 17	% w/w
Potassium Bicarbonate	7.5
Polypropylene Glycol 150	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100
Product pH	8.4
% Removal of soil	95

Example 18	% w/w
Potassium Bicarbonate	7.5
Polyethylene Glycol 200	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100

Product pH	8.4
% Removal of soil	95

Example 19	% w/w
Potassium Bicarbonate	7.5
Polyethylene Glycol 300	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100

Product pH	8.4
% Removal of soil	90

Example 20	% w/w
Potassium Bicarbonate	7.5
Polyethylene Glycol 600	20.0
Sodium Dodecyl Benzene Sulphonate	1.0
Veegum T	1.5
Xanthan Gum	0.05
Titanium Dioxide	0.5
Water	to 100

Product pH	8.4
% Removal of soil	90

The performance of the composition according to Examples, for instance, 1 to 5 was equal to that of a molar equivalent active level of caustic soda in the same formulation base.

Caustic soda based products on the market when tested under identical conditions removed only 80-95% of the baked-on dripping.

A synergistic effect between the polyhydric alcohol(s)

and the non-caustic alkali metal salt(s) has been demonstrated by testing glycerol and sodium bicarbonate separately alongside a mixture of both on the same prepared test plate.

Sodium bicarbonate on its own removed only 50% of the baked-on dripping and glycerol on its own removed only 30% of the baked-on dripping whereas the mixture of sodium bicarbonate and glycerol removed 100% of the baked-on dripping.

CLAIMS

We claim:-

1. An oven cleaner containing as active ingredients an effective amount of an alkali metal bicarbonate, sesquicarbonate or carbonate or a mixture thereof and a polyhydric alcohol which is liquid and substantially non-volatile at the desired cleaning temperature and in which the alkali metal salt is soluble at that temperature.

2. An oven cleaner as claimed in claim 1 in which the polyhydric alcohol has the general formula:-

$CH_2OH(CHOH)_nCH_2OH$

wherein n = 0, 1, 2, 3 or 4.

3. An oven cleaner as claimed in claim 1 in which the alkali metal salt is a potassium salt and in which the polyhydric alcohol is selected from the group comprising propylene glycol, diethylene glycol, polyethylene glycol, dipropylene glycol, polypropylene glycol, triethylene glycol and 1, 2, 6 hexanetriol.

4. An oven cleaner as claimed in claim 1 in which the oven cleaner contains at least 35% by weight of water.

5. An oven cleaner as claimed in claim 1 in which the desired cleaning temperature is between 125 and 250°C.

6. An oven cleaner as claimed in claim 1 in which the alkali metal salt is present in an amount of from 2% to 20% by weight of the oven cleaner.

7. An oven cleaner as claimed in claim 1 in which the alkali metal salt is a sodium or potassium salt.

8. An oven cleaner as claimed in claim 1 in which the polyhydric alcohol is present in an amount of from 1 to 50% by weight of the oven cleaner.

9. An oven cleaner as claimed in claim 1 in which the polyhydric alcoholis glycerol.

10. An oven cleaner as claimed in claim 1 in which the oven cleaner has a pH of less than 11.

11. An oven cleaner as claimed in claim 10 in which the oven cleaner has a pH of less than 10.

12. An oven cleaner as claimed in claim 11 in which the oven cleaner has a pH of 9 or less.

13. An oven cleaner as claimed in claim 1 in which the oven cleaner additionally contains a surfactant, a fragrance, a pigment marker, a propellant, a thickener, or a mixture of two or more of these ingredients.

14. A method for cleaning a cooking surface carrying baked on fats or greases, comprising applying an oven cleaner as claimed in any one of claims 1 to 13 to the cooking surface heating the cooking surface to at least 125°C for a period of at least five minutes and washing and/or wiping the saponified fats or greases from the cooking surfaces.

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 83305244.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	DE - A1 - 3 124 348 (METALLGESELL-SCHAFT AG) * Claims 1-6 * --	1-4, 6,8-13	C 23 G 1/14 C 23 G 1/18 C 23 G 5/02 C 11 D 7/12 C 11 D 7/26 C 11 D 7/60 B 08 B 3/08
D,X	GB - A - 1 576 454 (CHURCH & DWIGHT CO. INC.) * Totality; especially page 2, lines 46-63; claims * --	1-3,5, 8-14	
X	GB - A - 1 478 482 (CHURCH & DWIGHT CO. INC.) * Totality; especially tables, claims 1-3,8-11 * --	1-4,6-12	
X	GB - A - 1 478 481 (CHURCH & DWIGHT CO. INC.) * Totality; especially talbes, claims * ----	1-4,6-12	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) C 23 G C 11 D B 08 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	18-11-1983	SLAMA

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

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