

[54] COMPOSITION FOR CLEANING METAL COOKWARE

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[58] Field of Search 252/524, 139, 542, 153, 252/154, 155, 162, 163, 259.5, 529; 134/39, 40, 2, 7, 30

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[57] ABSTRACT

Baked-on, hardened, or carbonized food debris may be easily removed from metal cookware by contacting the debris with a mixture of kaolin and a solvent which is N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-isopropyl-2-pyrrolidone, or 2-amino-2-methyl-1-propanol, or mixtures thereof, followed by soaking in hot water, and rinsing. The mixture of kaolin and solvent is also useful as a hand cleaner.

6 Claims, No Drawings

COMPOSITION FOR CLEANING METAL COOKWARE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention finds utility for the removal of stubbornly adhering hardened or carbonized food debris from metal surfaces of cookware, and as a hand cleaner.

Heretofore, baked-on or carbonized food debris has been very difficult to remove from the metal surfaces of cookware, requiring treatment with an abrasive material, such as scouring steel-wool pads. Even with this treatment, it was necessary to expend considerable effort, and often more than one scouring step was required to remove all of the debris.

2. Discussion of the Prior Art

The essential components of the present invention, i.e., kaolin and solvents, are individually known.

The kaolin component is described in detail hereinafter and may be obtained from the firm of Moore and Munger. The solvents are commercially available, the compounds N-methyl-2-pyrrolidone and 2-amino-2-methyl-1-propanol being listed for example in the Eastman Kodak Company Catalogue, List No. 45, 1969.

U.S. Pat. No. 2,174,242 discloses the method for the preparation of 2-amino-2-ethyl-1,3-propanediol, a compound analogous to the instant 2-amino-2-methyl-1-propanol.

SUMMARY OF THE INVENTION

It has now been discovered that baked-on, hardened, or carbonized food debris can be easily removed from metal surfaces of cookware by a simple procedure, specifically by contacting the debris with a mixture of kaolin and a compound selected from the group consisting of N-methyl-2-pyrrolidone, N-ethyl-pyrrolidone, N-isopropyl-2-pyrrolidone, and 2-amino-2-methyl-1-propanol and mixtures thereof, followed by soaking in hot water, and rinsing.

It is an object of the invention to provide a simple composition suitable for substantially completely removing stubbornly adhering food debris from metal surfaces of cookware.

It is another object of the invention to provide a simple composition effective to remove substantially completely stubbornly adhering food debris from metal surfaces of cookware in an operation that does not require scrubbing.

It is a further object of the invention to provide a simple composition suitable with the conjoint use of water for removing grease and grime from the hands.

DETAILED DESCRIPTION OF THE INVENTION

The invention provides a composition comprising a mixture of kaolin and a solvent selected from the group consisting of N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-isopropyl-2-pyrrolidone, and 2-amino-2-methyl-1-propanol, and mixtures thereof, as a cleaning composition for the purposes mentioned hereinabove.

More specifically, the invention provides a composition comprising:

- i. about 3 to about 9 parts by weight of sedimentary kaolin, and
- ii. 1 part by weight of one or more of the aforementioned solvents.

Ratios of solvent higher than 1 part solvent for 3 parts kaolin result in a powder which although free flowing, tends to pressure pack.

Mixtures of kaolin and solvent within the ratios in accordance with the present invention are free flowing and are in fine particulate form, and tend to be somewhat dusty. The dusting is eliminated or greatly reduced if there is incorporated in the composition about 2% to about 10% of a dedusting agent. Suitable dedusting agents include such water-soluble salts as sodium tripolyphosphate, sodium chloride, sodium sulfate, tetrasodium pyrophosphate, sodium dihydrogen orthophosphate, disodium hydrogen orthophosphate, trisodium orthophosphate, sodium carbonate, sodium bicarbonate, sodium metaborate, sodium tetraborate, sodium metasilicate, sodium citrate, sodium sulfite, and the corresponding potassium salts. The sodium tripolyphosphate also serves as a dispersant by assisting in preventing lump formation when hot water is added to the baked-on food debris which has been coated with the composition.

If desired, a surfactant may be included in the composition to assist in emulsifying any overlying grease adhering to the baked-on food debris.

If a surfactant is employed, the type thereof is immaterial, so long as the emulsification properties are adequate to assist the cleaning operation when the burned-on food debris contains grease. Suitable surfactants are found within the classes of anionics, amphoterics, and nonionics, and are well known to those skilled in the art. The alkylbenzenesulfonates, alkyl sulfates, sulfated ethoxylated fatty alcohols, taurates, isethionates, ethoxylated fatty alcohols, alkyl beta-alanines, and the cycloimidates disclosed in U.S. Pat. Nos. 2,528,378 and 2,781,354 are suitable. More specific surfactant species may be selected from the disclosures in the texts "Surface-Active Agents", Schwartz and Perry, Volume I, 1949, and "Surface-Active Agents and Detergents", Schwartz, Perry and Berch, Volume II, 1958, both published by Interscience Publishers, Inc., New York, which are incorporated herein by reference.

The compositions useful for carrying out the process of the present invention may contain the above-mentioned components in the following proportions:

	Percent By Weight Broad	Preferred
Solvent	10-25	12-20
Kaolin	65-90	70-85
Sodium tripolyphosphate	0-10	3-10
Surfactant	0-10	0-5

The invention provides a process for removing adhering hardened or carbonized food debris from metal surfaces of cookware comprising the steps of:

- i. covering said debris with a flowable, particulate mixture of sedimentary kaolin and a compound selected from the group consisting of N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-isopropyl-2-pyrrolidone, and 2-amino-2-methyl-1-propanol, and mixtures thereof,
- ii. contacting said mixture with hot water at 120°F to about 200°F, to form an aqueous cleansing medium,
- iii. allowing said aqueous cleansing medium to stand for at least 10 seconds and until at least a part of said debris has loosened, and

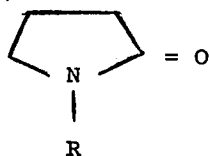
iv. rinsing said aqueous cleansing medium and said loosened debris from said metal surface.

It is within the scope of the present invention to employ water that is sufficiently hot, and to allow the aqueous cleansing medium to stand a sufficient length of time, to remove the debris substantially completely with no scrubbing or abrasion.

The process of the invention in most instances results in the loosening of the entire area of debris with substantially no spots that remain stubbornly adhering. The force of water from the faucet may usually be used, if desired, to remove the loosened particles of debris, or these may be removed with a soft cloth or sponge, usually with the article being cleaned having contact with running water or under submersion in water.

As used herein the word "rinsing" includes the assistance of a soft cloth or sponge or the like to remove loosened debris. The thicker or more stubborn spots of debris may require a second treatment with the composition of the invention.

N-alkyl-2-pyrrolidones useful in the practice of the present invention have the structural formula:



wherein R is a lower alkyl group having from 1 to 3 carbon atoms. The compounds may be made by the procedure outlined in the handbook "M-Pyrol^(M)" published by the GAF Corporation Chemical Division, 140 W. 51st Street, New York, N.Y. 10022 (1972), the disclosures of which are incorporated herein by reference. The above-described pyrrolidones are miscible with water and many organic solvents. The methyl derivative has a boiling point of 202°C at 760 mm pressure, the ethyl derivative has a boiling point of 97°C at 20 mm pressure, and 218°C at 751 mm pressure, and the isopropyl derivative has a boiling point of 221°-222°C at 736 mm pressure.

The N-alkyl-2-pyrrolidones may be replaced in whole or in part by 2-amino-2-methyl-1-propanol with good results. The latter is too alkaline for use on aluminum utensils, but is suitable for use on stainless steel, cast iron, or other surfaces not affected by alkalis.

The compound 2-amino-2-methyl-1-propanol may be readily prepared by those skilled in the art. It is an article of commerce and may be purchased from the Eastman Kodak Company.

The kaolin useful in the practice of the present invention is a Georgia sedimentary clay of very fine particle size. It is a secondary, or alluvial, clay having an aspect ratio, that is, the ratio of the longest linear dimension of a particle to its shortest linear dimension, of about 10:1 to about 12:1. The kaolin has been subjected to a process of froth floating and deflocculation, and is substantially non-agglomerated.

A useful kaolin product is described in a brochure entitled "American and English Clays for the Paper Industry", published by the Anglo-American Clays Corporation, 52 Executive Park South, Atlanta, Ga., 30329. The clay employed in the Examples herein is the grade designated "Alphagloss", characterized in the above-named brochure as being a spray-dried particulate material of which 97% is finer than 2 microme-

ters, and 0.005% is left on a No. 325 screen is a wet-screening process. The particles are substantially dry, having 0 to 1% moisture, and have a pH of about 6.5 to about 7.5. The principal component may be represented by the oxide-type formula $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$, and comprises about 97%-98% of the kaolin. "Alphagloss" is a trademark of, and is made by, the Anglo-American Clays Corporation. It may be purchased from Moore and Munger, 777 Summer Street, Stamford, Conn., 06901.

The invention may be more fully understood by reference to the following Examples, which are illustrative but are not to be considered limitative of the invention.

EXAMPLE 1

Two 4-inch square polished aluminum panels are soiled with food debris by placing thereon a small quantity of homogenized milk, evaporating on a water bath to a syrupy consistency, spreading the syrup to form a substantially uniform layer, then baking for one hour at 400°F, and cooling to room temperature.

A cleaning composition is prepared having the following formula:

	Percent By Weight
N-methyl-2-pyrrolidone	15.00
Kaolin (Alphagloss)	80.00
Sodium tripolyphosphate	5.00
	100.00

pH of a 1% aqueous solution: 9.0

The mixture, a free-flowing powder, is sprinkled on the above-described soiled panels contained in a porcelain basin, covering the panels completely. Hot water at about 130°F is poured into the basin, covering the panels to a depth of one inch. The panels are allowed to soak for 10 minutes in the water maintained at a temperature of 130°-140°F. The panels are then removed from the water and rinsed under a hot tap water spray without rubbing. With the aid of a plexiglass template divided into 12 marked rectangular areas, it is estimated that the above-described treatment removes about 95% of the soil.

EXAMPLE 2

A stainless steel pan is soiled by spreading over the entire inner surfaces thereof a 1:1 mixture of milk and margarine and baking at about 400°F to form a baked-on, carbonized, hardened film of food debris. The particulate composition set forth in Example 1 is placed over the bottom and sides, covering the soil completely. Hot water (160°F) is placed in the pan and allowed to remain for 30 minutes. This treatment lifts the soil in the form of a film or skin, leaving the bottom of the stainless steel pan clean and bright. Spotty small areas of soil remain on the side, presumably due to failure of the cleaning product to cover the soil completely at the time of introducing the hot water.

EXAMPLE 3

A black iron frying pan is soiled and cleaned in the manner described in Example 1, except that 1%, total composition basis, of the 1-methyl-2-pyrrolidone is replaced by 1% of 2-amino-2-methyl-1-propanol. Near complete removal, leaving only a few partially soiled areas, is effected from bottom and sides.

EXAMPLE 4

Three 4-inch square polished aluminum panels are soiled as described in Example 1. The three panels are separately treated with the three components of the composition of Example 1 as the sole cleansing agent in the manner set forth in Example 1. None of the three components, namely 1-methyl-2-pyrrolidone, kaolin, or sodium tripolyphosphate, exhibits any cleansing action.

EXAMPLE 5

The following composition is suitable for removing baked-on food debris from stainless steel or iron cooking utensils.

	Percent By Weight
2-amino-2-methyl-1-propanol	15.00
Kaolin (Alphagloss)	80.00
Sodium tripolyphosphate	5.00
	100.00

pH of a 1% aqueous solution: 10.6

In place of the sodium tripolyphosphate component shown above, many other water-soluble salts may be employed with comparable results. Among the suitable salts are sodium chloride, sodium sulfate, tetrasodium pyrophosphate, sodium dihydrogen orthophosphate, disodium hydrogen orthophosphate, trisodium orthophosphate, sodium carbonate, sodium bicarbonate, sodium metaborate, sodium tetraborate sodium metasilicate, sodium citrate, sodium sulfite, and the corresponding potassium salts.

EXAMPLE 6

The following compositions are within the invention:

Components	A	B	Percent By Weight				G	H
			C	D	E	F		
N-methyl-2-pyrrolidone	10			20			25	
N-ethyl-2-pyrrolidone		22			10			
N-isopropyl-2-pyrrolidone								15
2-amino-2-methyl-1-propanol			25			20		
Kaolin (Alphagloss)	90	68	65	75	75	72	70	85
Sodium tripolyphosphate			10		5	5	5	
Sodium lauryl sulfate		10				3		
Sodium alkylbenzene-sulfonate ^(a)				5				
Lauryl alcohol . 30 E.O. ^(b)					10			

^(a)The alkyl group is a straight chain averaging about 13 carbon atoms.
^(b)A nonionic surfactant containing 30 molar proportions of ethylene oxide in the molecule.

Having thus described the best modes for carrying out the invention, modifications thereof will occur to those skilled in the art, and the invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A detergent composition in fine particulate form suitable for use in removing adhering carbonized food debris from metal surfaces comprising in admixture:

- i. one part by weight of a solvent selected from the group consisting of N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-isopropyl-2-pyrrolidone, and 2-amino-2-methyl-1-propanol, and mixtures thereof, and

- ii. about 3 parts to about 9 parts by weight of sedimentary kaolin.

2. A composition in accordance with claim 1 comprising in admixture:

- i. one part by weight of N-methyl-2-pyrrolidone, and
- ii. about 4 parts to about 6 parts by weight of sedimentary kaolin.

3. A composition in accordance with claim 1 wherein said sedimentary kaolin contains about 14% H₂O, about 44.9% SiO₂, and about 38.3% Al₂O₃ combined together in the molecular constitution of said kaolin.

4. A composition in accordance with claim 1 comprising about 10-25 percent of said solvent, about 65-90 percent of said kaolin, 0 to about 10% of a water-soluble salt dedusting agent, selected from the group consisting of sodium tripolyphosphate, potassium tripolyphosphate, sodium chloride, potassium chloride, sodium sulfate, potassium sulfate, tetrasodium pyrophosphate, tetrapotassium pyrophosphate, sodium dihydrogen orthophosphate, potassium dihydrogen orthophosphate, trisodium orthophosphate, tripotassium orthophosphate, sodium carbonate, potassium carbonate, sodium bicarbonate, potassium bicarbonate, sodium metaborate, potassium metaborate, sodium metasilicate, potassium metasilicate, sodium citrate, potassium citrate, sodium sulfite and potassium sulfite and 0 to about 10% of a surfactant having emulsifying properties.

5. A composition in accordance with claim 1 comprising about 10-25 percent of said solvent, about 65-90 percent of said kaolin, 0 to about 10% of sodium tripolyphosphate dedusting agent, and 0 to about 10% of a surfactant having emulsifying properties.

6. A process for removing hardened adhering food debris from metal surfaces comprising the steps of:

- i. covering said debris with a flowing, particulate mixture comprising about 3 parts to about 9 parts by weight of sedimentary kaolin and one part by

weight of a solvent selected from the group consisting of N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-isopropyl-2-pyrrolidone, or 2-amino-2-methyl-1-propanol, and mixtures thereof,

- ii. contacting said mixture with hot water at 120°F to about 200°F, to form an aqueous cleansing medium,
- iii. allowing said aqueous cleansing medium to stand for at least 10 seconds and until at least a part of said debris has loosened, and
- iv. rinsing said aqueous cleansing medium and said loosened debris from said metal surface.

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