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ABRASIVE SCOURING POWDER

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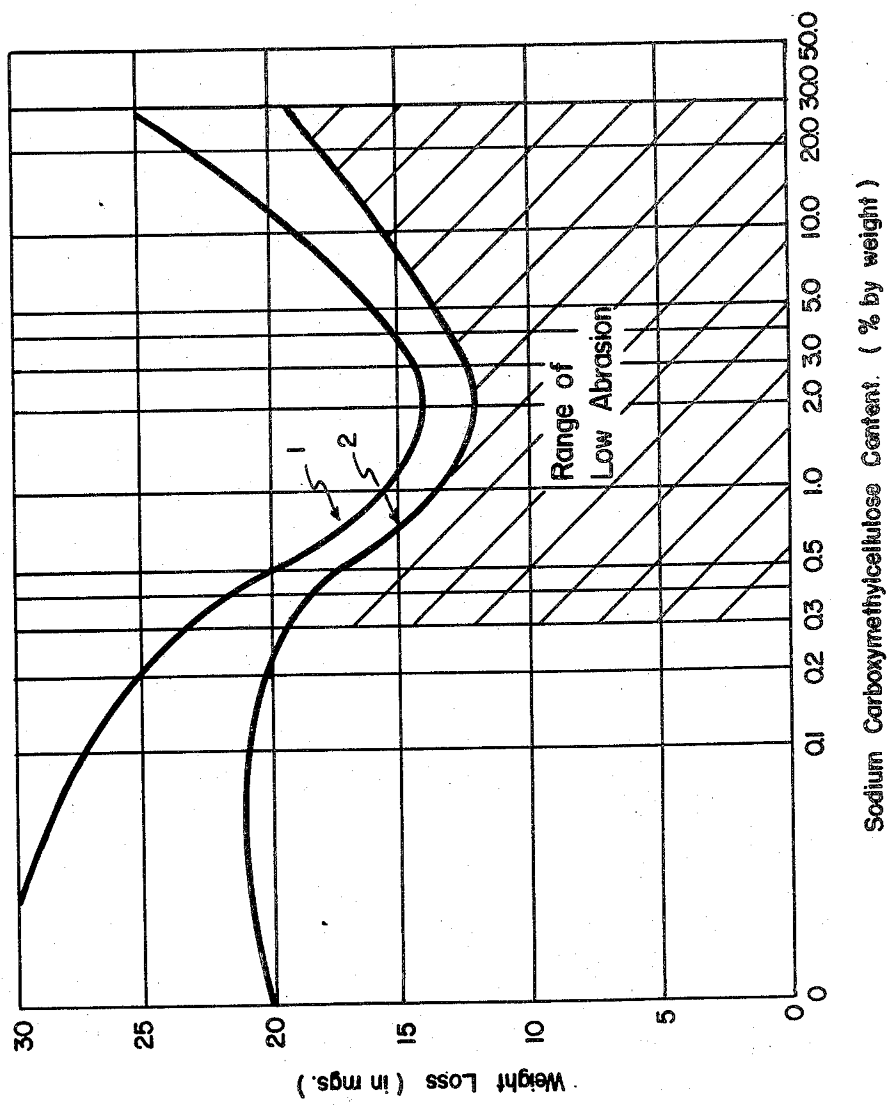

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ABRASIVE SCOURING POWDER

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The present invention relates to an abrasive scouring powder containing an additive agent for controlling, or inhibiting to a desired maximum extent, the abradant action of the abrasive ingredient. Abrasive scouring powders generally enjoy extensive application and use as household cleansers for scouring, cleaning and washing kitchen utensils, porcelain ware, painted and enameled woodwork, marble and tile surfaces, and the like. The mechanical detergent action due to the presence of a water insoluble, relatively hard, finely ground, mineral substance is particularly desired for such detergent, cleaning and washing purposes because of its ability to loosen the more tenaciously adherent soils and dirt. However, in the case of employing such abrasive scouring powders on the surface of relatively softer materials, such as aluminum pans and utensils, and woodwork, the abrasive action must be so controlled or inhibited as to be sufficient to loosen the soil and dirt, but not so great as to wear away, grind off, or abrade the surface being cleaned.

We have discovered that the addition of sodium carboxymethylcellulose (alternatively termed "sodium cellulose glycollate" or the "sodium salt of cellulose glycollic acid") has the effect of producing such an abradant-controlling or -inhibiting action. The mineral abrasive substances in which this controlling action has been found effective are silica flour, tripoli, volcanic ash, feldspar, pumice and pumicite. Such abrasive ingredients are present in the scouring powder composition in the amount of at least 70% by weight [1] thereof.

It has been further discovered, as a material component of our invention, that the sodium carboxymethylcellulose ingredient should be present in the critical proportion of 0.3–30.0%; the preferred limits within this broader range being 0.5–10.0%.

An inorganic, alkaline salt detergent material, on the order of 1–25% is customarily incorporated in an abrasive scouring powder composition and such detergent material is to be selected from the group, consisting of alkali metal (preferably sodium) -carbonates, -bicarbonates, -phosphates, -silicates and -borates.

Soap has also been employed in abrasive scouring powder compositions for the purpose of imparting wetting and sudsing action thereto. We have found that the basic ingredients of our composition, namely: The abrasive material and sodium carboxymethylcellulose, are particularly effective when an alkyl aryl sulfonate synthetic wetting and sudsing compound is employed instead of soap. Sodium alkyl aryl sulfonate, whose alkyl and aryl groups are derived from petroleum hydrocarbon distillates boiling in the range of 150–300° C. and hydrocarbons of the bendene series, respectively, and present in the amount of 2–6%, constitute a synthetic wetting agent or detergent which is especially suitable and compatible in the abrasive scouring powder compositions of our invention. Such sodium alkyl aryl sulfonates are more commonly commercially available in the sodium sulfate-built form, which consists of approximately 40% of the sulfonated organic compound and 60% of Na_2SO_4. It is this type of ingredient which will hereinafter be referred to as being employed in the composition within the scope of our invention, unless otherwise noted. Such alkyl aryl sulfonate synthetic detergents are also, and more recently, referred to as "sodium kerylbenzene sulfonate" wherein the prefix "keryl" denotes the obvious derivation of the alkyl group from a petroleum hydrocarbon distillate fraction falling generally in the kerosene boiling point range.

[1] All percentages hereinafter given are on the weight basis.

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In brief summary of our invention, the basic water insoluble, abradant-inhibited, mineral abrasive ingredient conforms to the following formula:

	Per cent
Water-insoluble mineral abrasive	At least 70
Sodium carbovymethylcellulose	0.3–10

In commercially suitable formulations, the proportions of the ingredients of abrasive scouring powder compositions embodying our invention will be found to fall in the following ranges:

Ingredients:	Per cent
Water insoluble mineral abrasive	At least 70
Alkaline salt detergent	1–25
Sodium carboxymethylcellulose	0.5–10

A synthetic wetting or sudsing agent, such as the sodium kerylbenzene sulfonate, mentioned above, can optionally be incorporated into the composition in the amount of 2–6% and in partial substitution for the alkaline salt detergent, in which case the maximum range limit of the latter will be reduced to 23%.

The abradant-controlling action imparted by the 0.3–30.0 content of sodium carboxymethylcellulose also has the additional advantages which are made manifest to the average user of the abrasive scouring powder in that the resultant composition has less "grittiness" and "scratchiness" and a smoother feel. The presence of the sodium carboxymethylcellulose also carries the further advantage in that it acts as a spreading or dispersing agent in a water solution which in turn imparts the property of improved rinsability to the abrasive scouring powder composition when the latter is rinsed with water from the surface being cleaned; and thus further prevents the setting-out and deposition of water-insoluble material in drain pipes.

To the accomplishment of these foregoing and related ends and to enable any person skilled in the art readily to understand and practice the invention, the following full and concise description and annexed drawing set forth the best mode in which we have contemplated applying the principle thereof.

The annexed drawing is a chart showing the relationship between the abrading action of the scouring powder embodying the principle of our invention on aluminum surfaces to the percentage content of sodium carboxymethylcellulose.

In order to establish an accurate determination of the abradant-controlling action of the sodium carboxymethylcellulose additive ingredient, the following test procedure was adopted:

The composition to be tested was first mixed with water in a pre-determined ratio to obtain a paste or slurry of standard thickness or consistency. This was done by weighing 25 grams of the test composition into a beaker and titrating with distilled water to a standard consistency. The end point of standard consistency was determined when the crevice formed by a glass rod rapidly drawn through the slurry or paste closed immediately. A portion of the so-prepared paste or slurry was then placed on a test disk of aluminum mounted upon the rotating table of an abrasion testing machine known as a "Taber Abraser" Research Model type No. CSO. The aluminum test disk was composed of 3S–O grade aluminum 4 inches in diameter and 0.030 inch thick. A doctor blade was mounted across the face of the aluminum test disk in order to continuously direct feed of the paste into the path of the rubber abrading wheel. Each sample of test composition was subjected to 2000 wear cycles, or revolutions, on the test disk. The test disk was washed in soap and water, rinsed in acetone and alcohol, dried at 105° C. and weighed before and after being subjected to the 2000 wear cycles. The loss in weight of the aluminum test disk in milligrams was then taken as the measurement of the amount of abrasion.

Example 1

A basic ingredient formulation, consisting of silica flour (150 mesh) and varying amounts of sodium carboxymethylcellulose (.55–.75 degree of substitution, or mol content of glycollic acid substituent, per glucose unit of the cellulose, and 10–20 C. P. S. viscosity in a 2% aqueous solution at 25° C.) was subjected to such test. A standard consistency paste or slurry of the silica flour alone was employed as the control. Plotting the weight loss in milligrams, as evaluated by the above described test procedure, against the sodium carboxymethylcellulose content, the relationship therebetween is shown by the curve 1 in the drawing. The horizontal ordinates of this drawing are based upon a logarithmic scale for the purpose of convenience in representation and

primarily because of the rather sharply occurring changes in the slope or characteristics of the curve at the sodium carboxymethylcellulose content values of 1% and below.

It will be seen from curve 1 that in the sodium carboxymethylcellulose range of 0.3–30.0%, the abrasive loss is 24 milligrams or less as compared to the abrasive weight loss value of 31.4 milligrams for the silica flour alone. In other words, within this critical range, shown by the shaded area and labelled "Range of low abrasion," the abradant action is inhibited by the sodium carboxymethylcellulose to an extent of at least a one-quarter reduction; and at the optimum content of 2% sodium carboxymethylcellulose, the inhibiting action produces a better than 50% reduction.

Example 2

A second series of similar abrasion tests were conducted upon an abrasive scouring powder formulation, corresponding to a commercial product, as follows:

Ingredients	Weight	Per Cent by Weight
	Grams	
Silica flour (140 mesh)	23.375	93.5
Tetrasodium pyrophosphate	0.500	2.0
Bentonite	0.125	0.5
Sodium kerylbenzene sulfonate [1]	1.000	4.0
	25.000	100.0

[1] 58% by weight Na_2SO_4; this type of "salt-built" sodium kerylbenzene sulfonate used throughout the examples hereinafter given.

Sodium carboxymethylcellulose of .55–.75 degree of substitution and a viscosity of 10–20 C. P. S. (2% solution at 25° C.) was then added to the above given formulation in amounts varying from 0–10% by weight on a total weight basis.

The results of the abrasion tests conducted on this last described series of samples is represented by curve 2 in the drawing, from which it is to be unusually remarked that with the initial addition of a fractional percentage amount of sodium carboxymethylcellulose that there is a slight increase in abrasion or weight loss of the tested specimens, but that a 0.3% of sodium carboxymethylcellulose, the curve begins to reverse its slope, thus displaying the initial inhibiting action upon the abradant properties of the composition. At 2.0% of sodium carboxymethylcellulose, the abrasion action reaches a minimum and then undergoes an increase up to 30%. Curve 2 thus confirms the results of curve 1, and the "Range of low abrasion." The narrower or preferred sodium carboxymethylcellulose range of 0.5–10.0% here represents one which is completely reliable for commercial manufacturing and formulation purposes, since the reduction of abradant action is between approximately one-quarter (16.7 milligrams weight loss at 0.5% sodium carboxymethylcellulose, 14.3 milligrams weight loss at 10% sodium carboxymethylcellulose, as compared to 20.3 milligrams weight loss with no sodium carboxymethylcellulose present) and approximately one-half (11.7 milligrams weight loss) at 2% sodium carboxymethylcellulose.

As a further aid to those skilled in the art to readily understand our above described invention, and to practice and formulate suitable abrasive scouring powder compositions within the scope thereof, the following exemplary formulations are given:

Example 3

Ingredients:	Per cent by weight
Silica flour	93.50
Sodium kerylbenzene sulfonate	1.80
Modified soda[1]	3.60
Sodium carboxymethylcellulose	0.60
Bentonite	0.50
	100.00

[1] Molecular combination of Na_2CO_3 and $NaHCO_3$.

Example 4

Ingredients:	Per cent by weight
Silica flour	93.50
Tetrasodium pyrophosphate	2.00
Sodium kerylbenzene sulfonate	3.64
Sodium carboxylmethylcellulose	0.86
	100.00

Example 5

Ingredients:	Per cent by weight
Volcanic ash	83
Modified soda	12
Sodium kerylbenzene sulfonate	3
Sodium carboxymethylcellulose	2
	100

Example 6

Ingredients:	Per cent by weight
Silica flour	94
Sodium kerylbenzene sulfonate	4
Sodium carboxymethylcellulose	2
	100

Equivalent modes of practicing our invention may be followed provided that they are within the scope and purview of the appended claims.

We, therefore, distinctly claim and particularly point out as our invention:

1. A scouring powder composition comprising essentially at least 70% by weight of a relatively hard, finely ground mineral substance selected from the group consisting of silica flour, tripoli, volcanic ash, feldspar, pumice and pumicite, 1–25% of an alkaline detergent material selected from the group consisting of alkali metal carbonates, -bicarbonates, -phosphates, -silicates and -borates, and 0.5–10% of sodium carboxymethylcellulose.

2. A scouring powder composition comprising essentially at least 70% by weight of a relatively hard, finely ground, mineral substance selected from the group consisting of silica flour, tripoli, volcanic ash, feldspar, pumice and pumicite; 1–23% of an alkaline detergent material selected from the group consisting of alkali metal carbonates, -bicarbonates, -phosphates, -silicates -borates; 2–6% of sodium alkyl aryl sulfonate whose alkyl and aryl groups are derived from petroleum hydrocarbon distillates boiling in the range of 150–300° C. and hydrocarbons of the benzene series, respectively, and 0.5–10% of sodium carboxymethylcellulose.

3. A scouring powder composition comprising essentially at least 70% by weight of silica flour, 1–23% of an alkaline detergent material selected from the group consisting of alkali metal carbonates, -bicarbonates, -phosphates, -silicates and -borates; 2–6% of sodium alkyl aryl sulfonate whose alkyl and aryl groups are derived from petroleum hydrocarbon distillates boiling in the range of 150–300° C. and hydrocarbons of the benzene series, respectively, and 0.5–10% of sodium carboxymethylcellulose having a viscosity of 10–20 C. P. S. and a .55–.75 degree of substitution.

4. A scouring powder composition comprising essentially 93.5% by weight of silica flour, 2% tetrasodium pyrophosphate, 4% of sodium alkyl aryl sulfonate whose alkyl and aryl groups are derived from petroleum hydrocarbon distillates boiling in the range of 150–300° C. and hydrocarbons of the benzene series, respectively, 0.5% of bentonite and 2% of sodium carboxymethylcellulose having a viscosity of 10–20 C. P. S. and a .55–.75 degree of substitution.

5. A scouring powder composition comprising essentially 83% by weight of volcanic ash, 12% modified soda, 3% of sodium alkyl aryl sulfonate whose alkyl and aryl groups are derived from petroleum hydrocarbon distillates boiling in the range of 150–300° C. and hydrocarbons of the benzene series, respectively, and 2% of sodium carboxymethylcellulose having a viscosity of 10–20 C. P. S. and a .55–.75 degree of substitution.

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