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AEROSOL STARCH

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ABSTRACT OF THE DISCLOSURE

An aerosol starch composition containing a silicone lubricant which is a polydimethylsiloxane having a viscosity of 90,000 to 110,000 c.p.s. at 25° C., the silicone lubricant having been prepared by condensing a hydroxyl endblocked polydimethylsiloxane in emulsion. The lubricant makes ironing of clothes easier by providing excellent lubricity between the iron and the fabric, by conditioning the surface of the iron thus reducing starch build-up and making ironing of non-starched clothes easier, by improving the scorch resistance of the starch, and by imparting a softer hand to the starched clothes. This lubricant also alleviates the problem of spray dilation.

While the past few decades have been variously called the Atomic Age, the Space Age, or the Golden Age, they could equally well be called the Housewife's Age because of the vast efforts and resources expended to "improve the housewife's lot," whatever that means.

The modern housewife has such things as instant foods, complete frozen meals, automatic cooking implements, electric can openers, garbage disposals, dishwashers, home permanents, hair driers, wigs, false eyelashes (etc.), automatic clothes washers and driers, wrinkle resistant clothes, wash and wear clothes, and permanent press (would you believe almost permanent?) clothes.

The foregoing notwithstanding, the modern housewife still finds that there are some clothes that require ironing, for sake of habit if nothing else. Also, for primarily traditional reasons, certain items that are ironed are also starched. Present day technology has reduced the once tedious starching job to a simple task which requires only the spraying of the item with a starch composition provided in a convenient aerosol container. To ease the housewife's chore of pushing the iron over the piece of clothes being ironed, it has become a relatively common practice to add a silicone lubricant to the starch compositions. Typically, the silicones employed have been polydimethylsiloxane fluids.

For reasons of economy, it is desirable to obtain the optimum in lubricating properties from the silicone additive while using it in the lowest possible concentration. With the heretofore known silicone lubricants it was found, and not surprisingly so, that below certain concentrations little if any lubricating properties were imparted to starch compositions. It has now been found, quite unexpectedly, that if a polydimethylsiloxane fluid having a viscosity of 90,000 to 110,000 c.p.s. at 25° C., said polydimethylsiloxane having been prepared by condensing a hydroxyl endblocked polydimethylsiloxane in emulsion using the process of U.S. Patent 3,294,725, the disclosure of which is hereby incorporated by reference, is employed as a lubricant in a starch composition that the concentration can be reduced to a level where the heretofore known polydimethylsiloxane lubricants are virtually useless.

The heretofore used polydimethylsiloxane fluids when added to aerosol starch formulations also tended to cause the dilation of the spray pattern to a ring or donut shape thus resulting in the starch being applied unevenly to the fabric with the obvious detrimental results. It was therefore quite unexpected to discover that when the polydimethylsiloxane fluids of this invention were employed in aerosol starch formulations that the problem of spray dilation was either significantly reduced or completely overcome.

Now, in order that those skilled in the art may better understand how the instant invention can be practiced, the following example is given by way of illustration and not by way of limitation. All percents referred to herein are on a weight basis and all viscosities measured at 25° C. unless otherwise specified.

Aerosol starches were prepared as follows:

First, a concentrate was prepared which consisted essentially of 95.43% or 95.63% water, 0.2% or 0.4% of emulsions containing 35% of various polydimethylsiloxane fluids having viscosities of about 100,000 c.p.s., 4% starch, 0.1% sodium benzoate (preservative), 0.03% formalin (bactericide) and 0.04% sodium bicarbonate (buffer). This concentrate was prepared by adding the starch to the water with continuous stirring, raising the temperature of the water to boiling, holding the temperature above 90° C. for 15 minutes, and then cooling with continued agitation to room temperature. Finally, the remaining ingredients were added.

94% of the above concentrate was then mixed with 3% of dichlorotetrafluoroethane and 3% of dichlorodifluoromethane and then packaged in an aerosol container.

There were three polydimethylsiloxane fluids evaluated in the above formulation. Fluid A was prepared by the solvent polymerization of dimethylsiloxane cyclics. Fluid B was prepared by the emulsion polymerization of dimethylsiloxane cyclics using the process of U.S. Patent 3,294,725. Fluid C was prepared by the emulsion polymerization of a hydroxyl endblocked polydimethylsiloxane using the process of U.S. Patent 3,294,725. Specifically, fluid C was prepared as follows: 608 g. of deionized water was placed in a 1500 ml. beaker and then 4.7 g. of dodecylbenzene sulfonic acid added, with agitation, until solution was complete. The pH of the solution was adjusted to 6.6 by the addition of triethanolamine with agitation. Then 365 g. of a hydroxyl endblocked polydimethylsiloxane having a viscosity of about 80 c.p.s. was added and agitation continued for 5 minutes. This mixture was then passed through a colloid mill twice at a mill tolerance of 0.006 inch and followed by three passes through a homogenizer at 5000 p.s.i. Next, 2% of a 25% aqueous solution of dodecylbenzene sulfonic acid was added, and the mixture allowed to agitate slowly at room temperature for 6 hours. After this time the emulsion was neutralized (pH 7.3) by the addition of triethanolamine. Fluids A and B correspond to prior art materials and have been included for purposes of comparison. Fluid C represents the instant invention.

The above prepared aerosol starches were evaluated as follows: The hot iron to be used was cooled by running cold water on the sole-plate until it was cool to the touch. In the center of the sole-plate some Wisk detergent was squirted (a spot about the size of a quarter) and about one-third of a gram of Kaopolite SF placed on top of the detergent. "Wisk" is a commercial heavy duty liquid detergent consisting essentially of about 20–25% inorganic builder salts (complex silicates and phosphates), 10–15% synthetic detergents (dodecylbenzene sulfonate, tallow alcohol sulfate, lauric diethanolamide, alkyl phenol ethylene oxide adduct), 10% solubilizing agents (sodium alkyl naphthalene sulfonate), 0.2–0.4% anti-redeposition agent (sodium carboxymethylcellulose) 0.0–0.6% colloidal dispersant (Methocel-methylcellulose), 0.1% optical brightener and the balance water. Kaopolite SF is anhydrous aluminum silicate plates used as an abrasive. A piece of cheesecloth folded into a 2" by 2" square was

wet with water and used to vigorously rub the detergent-abrasive mixture over the sole-plate of the iron. Rubbing was continued until the cloth began to "drag." Then the cloth was wet with more water and rubbing continued until there was some pick-up of metal on the cloth. Then the detergent-abrasive mixture was rinsed off with water and then the water rinsed off with isopropanol. Finally, the sole-plate was briskly wiped dry with a clean piece of cheesecloth. The temperature control on the iron was set half way between the linen and cotton settings—about 425° F. Using the iron equipped with a spring balance attached to the handle the force required to pull the iron, traveling at 44 inches per minute over a 12 inch strip of clean (unstarched) dry white 80² cotton cloth, was measured. A 9 inch by 16 inch strip of the clean dry cloth was sprayed with each aerosol formulation so that equal amounts (about 95% wet pick-up) of the formulations were applied. The starched cloth was then ironed to dryness. Finally, the force required to pull the iron across the cloth was measured as before. It was noted during the tests that formulations made with fluids A and B exhibited spray dilation problems which were almost completely absent in the formation made with fluid C. Also, it was difficult to make stable emulsions with fluid A. Results of the tests with the various formulations are set forth in the table below. A starch formulation prepared as above but containing no silicone gives a result of about 380 g. in this test.

Silicone fluid in the emulsion	Lubricity (g.), percent silicone		Lack of spray pattern dilation	Emulsion stability
	0.2	0.4		
A	70	27.5	Fair	Fair.
B	138	38	Poor	Excellent.
C	98	34	Excellent	Do.

That which is claimed is:

1. In a silicone lubricant containing aerosol starch composition for use on fabrics, the improvement comprising using as the silicone lubricant, in an amount effective to significantly reduce the problem of spray dilation, a polydimethylsiloxane having a viscosity of 90,000 to 110,000 cps. at 25° C., said polydimethylsiloxane having been prepared by condensing a hydroxyl end-blocked polydimethylsiloxane in emulsion.

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