

[54] **NONFLOURIDE LAUNDRY SOUR
CONTAINING FUMARIC ACID**
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[57] **ABSTRACT**
The laundering of fabrics is improved by the use of fumaric
acid as a laundry sour. Very satisfactory results are obtained
by the use of a laundry sour containing a predominant amount
of fumaric acid and a minor amount of a glassy sodium
metaphosphate.

5 Claims, No Drawings

NONFLOURIDE LAUNDRY SOUR CONTAINING FUMARIC ACID

BACKGROUND OF THE INVENTION

1. Field of the invention

This invention relates to improvements in the art of laundering fabrics, and more particularly relates to improvements in neutralization of the residual alkalinity and prevention of iron stain formations in the laundered fabrics.

2. Description of the Prior Art

The ability to remove the stains, particularly iron and rust stains, has long been recognized as a highly desirable characteristic in a laundry sour. Historically oxalic acid and fluoride salts have been regarded as the prime anti-rust agents for sours by virtue of the fact that neophytes have been unable to achieve the same degree of efficacy. Although oxalic acid and the fluorides are quite efficient, their use in all phases of the modern laundry industry has not been encouraged as a result of particular aggression towards cellulosic fibers and a high degree of toxicity. U.S. Pat. No. 2,086,867 discloses the sequestering of iron, aluminum and copper in neutral or only slightly alkaline solutions by the use of the sodium hexametaphosphate. This patent further teaches that in alkaline solutions encountered in laundering operations metaphosphate complexes resulting from the use of sodium hexametaphosphate may be kept in solution by the use of tartrates, oxalates or citrates. U.S. Pat. No. 2,331,396 teaches the use of sodium acid fluoride and up to 10 weight percent of sodium hexametaphosphate as a stabilized laundry sour. However, as previously pointed out due to toxicity, solubility limitations and/or cost considerations, the foregoing compositions cannot be considered ideal laundry sours, and considerable efforts have been expended over the years to find improved compositions.

It is, therefore, an object of this invention to provide a more satisfactory laundry sour which is free of objectionable toxicity. It is yet another object of this invention to provide a more comprehensive laundry sour which goes beyond the traditional role of simply neutralizing the excess alkalinity. These and other objects will become readily apparent to one of skill in the art upon reading of the following specification.

SUMMARY OF THE INVENTION

In accordance with this invention, there is provided an improvement in the laundering of fabrics comprising the use of fumaric acid as a laundry sour. Furthermore, a comprehensive laundry sour composition is obtained by using a composition comprising a major amount of fumaric acid and a minor amount of a glassy sodium phosphate.

DESCRIPTION OF THE PREFERRED EMBODIMENT

It was surprising to find that fumaric acid, a low molecular weight dicarboxylic acid, was an effective laundry sour in view of the prior art which placed heavy emphasis on tri and higher carboxylic acids or hydroxy carboxylic acids. The amount of fumaric acid employed of course will depend upon the alkalinity of the rinse water, but in general, satisfactory results are obtained when the acid is added to the rinse water in amount of about 0.01 to about 0.05 percent by weight. The fumaric acid employed in this invention can be any of the regular grades of fumaric acid normally available ranging from the ordinary commercial grade to reagent grade. It is of course well known that fumaric acid is an acceptable food acidulant and hence for laundry purposes, can generally be considered non-toxic. In contrast, maleic acid which is the opposite stereo configuration of fumaric is toxic.

As indicated in discussing the prior art, it is conventional in laundering operations at the time of souring the washed fabrics is also sequester troublesome metal ions such as iron and copper so as to give the washed fabrics a cleaner brighter look. It is well known that iron contributes a yellow cast which is most pronounced upon white or light colored goods. Therefore, it has been found advantageous to incorporate in with

the fumaric acid a small amount of a glassy sodium phosphate having the generalized formula $(Na PO_3)_x$ wherein x has a value from about 3 to 22. Preferably the phosphate is sodium metahexaphosphate wherein $x = 6$. Depending upon the amount of iron concentration in the rinse water, it can also be advantageous to add small amounts of citric acid along with the sodium phosphate so as to prevent the precipitation out of the complexed iron and other metal salts. As is the case with the fumaric acid, any of the various grades of sodium phosphate and citric acid may be employed in the compositions of this invention. The fully formulated laundry sour of this invention will, therefore, contain from about 60 to about 90 weight percent fumaric acid, from about 10 to about 40 percent glassy sodium phosphate, e.g., sodium hexametaphosphate and up to about 10 percent citric acid. Especially desirable overall results are obtained when the composition comprises from about 60 to about 80 percent fumaric acid, from about 10 to about 25 percent sodium hexametaphosphate and about 5 to 10 percent by weight of citric acid. The formulated sour is added to the rinse water in an amount of about 0.02 to about 1.0 percent by weight.

The fumaric acid or formulated laundry sour is added to the rinse water fabric mixture in the customary manner and at the usual time and temperatures as is well known in the laundry art. The actual amount added will depend on local conditions such as alkalinity and metal ion concentration. In addition to using the invented composition in the normal souring operation, it will be readily apparent to those skilled in the laundry art that the composition can be used in a similar manner for an iron prevention measure. While the conditions of use differ from the foregoing two operations, the invented composition can also be used in the so called reclaim operation of laundries wherein iron and other material stains are removed from fabrics.

When used in the reclaim operation, most satisfactory results are obtained with the formulated laundry sour composition of this invention by using elevated water temperatures such as 160° to 190° and treating the fabric with the composition for about 10 to 25 minutes at a solution strength of about 0.1 to about 1.0 percent by weight. The invention is further described in the following example:

Swatches of iron oxide stain Indian Head muslin (3½ inch by 2½ inch) were placed in the standard laboratory Launderometer Wash Operation and treated with the indicated laundry sour composition at a concentration of 0.5 percent for 20 minutes. Afterwards, the swatches were removed, hand rinsed under running tap water and dried in an oven at 110°–120° C. The swatches were then evaluated with a Hunter D-40 Reflectance meter (blue) to determine the amount of change in appearance due to the reclaiming procedure. The procedure was then repeated with swatches which were a blend of 65 percent polyester and 35 percent cotton. Sour A was composed of 70 percent fumaric acid, 20 percent sodium hexametaphosphate, and 10 percent citric acid. Sour B was a commercial laundry sour which is a mixture of ammonium and sodium silicofluorides. The results of the reclaimed procedures are tabulated below in Table I.

TABLE I

Sour	Temperature	Δ Change in Hunter Blue Reflectance	
		Cotton Fabric	Polyester Cotton Blend
A 180°F		55.4	40.6
B 160°F		52.7	43.7

From inspection of the table, it is readily apparent that the sour composition of this invention is equally effective as the prior art silicofluoride salt sour, and yet the problem of toxicity has been avoided. In a similar manner, the sours of this in-

vention are equally effective in the prevention of iron deposition and redeposition in freshly laundered fabrics in addition to neutralizing the excess alkalinity which results in normal laundering procedures.

The foregoing example and methods have been described in the foregoing specification for the purpose of illustration and not limitation. Many other modifications and ramifications will naturally suggest themselves to those skilled in the art based on this disclosure. These are intended to be comprehended as within the scope of this invention.

What is claimed is:

1. An improved laundry sour composition consisting essentially of about 60 to about 90 percent by weight of fumaric acid, about 10 to about 40 percent by weight of a glassy sodium metaphosphate and from 0 to about 10 by weight of citric acid.

2. A composition according to claim 1 consisting essentially

of about 60 to about 80 percent by weight of fumaric acid, from about 10 to about 25 percent by weight of sodium hexametaphosphate and about 5 to 10 percent by weight of citric acid.

3. A rinse water containing from about 0.02 to about 1.0 percent by weight of the laundry sour composition of claim 1.

4. In a fabric laundering process wherein the washed fabrics are rinsed in an aqueous solution of a laundry sour composition, the improvement which comprises incorporating the composition of claim 1 into the aqueous rinse solution as a laundry sour.

5. The process of claim 4 wherein the temperature of the rinse solution is held at 160 to 190° F and the fabric is treated with the rinse solution of the laundry sour for about 10 to 25 minutes, whereby reclaiming of the laundered fabric is achieved.

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