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BLEACHING COMPOSITION

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This invention relates to bleaching textile materials in aqueous mediums, and has for its object providing for improvement in the extent of bleaching or lightening of the material.

According to the invention, there is used as a composition for bleaching in aqueous medium, a material comprising a textile oxidizing agent, a chelate agent, and a buffer for providing a pH of about 7-11 in the aqueous medium.

The use of such a composition provides improvement in the bleaching.

The aqueous media used within the contemplation of the invention are such aqueous media as are generally used as a medium in which to bleach textiles. Thus, the medium is composed of naturally occurring water or water containing minerals, and, in particular, cations of metals as commonly are present in water used as a medium for bleaching. The cations can be, for example, of iron, copper, calcium, magnesium, etc.

While the reason for the improvement realized according to the invention is not surely known, it is noted that the chelating agent may possibly interact with cations present in the medium and in this way alter the environment for the bleach with the result that improvement in bleaching is realized. It is surprising that the use of a chelating agent provides improvement in bleaching since, on the one hand, it seems that the presence of metal cations in the medium would catalyze the action of the textile oxidizing agent, whereas, on the other hand, it would be predicted that the chelating agent would interact with metal cations to tie up the cations and render them unavailable for catalyzing the action of the textile oxidizing agent. Be this as it may, however, as set forth above, it has been found that improvement is realized by utilization of the chelating agent.

The oxidizing agent can be any oxidizing agent suitable for bleaching textiles. It can be peroxide, peroxide type, chlorine, or hypochlorite bleaching material. Preferably the oxidizing agent is a peroxide type material, e.g. sodium perborate, potassium persulfate. Of these mentioned materials, sodium perborate is preferred. Suitable peroxides are metal peroxides such as zinc peroxide, peracetic acids, organic peroxides, and hydrogen peroxide. Preferred groups in addition to sodium perborate and potassium persulfate are: sodium perborate, potassium persulfate and hydrogen peroxide; sodium perborate and hydrogen peroxide; and potassium persulfate and hydrogen peroxide. Mixtures of the oxidizing agents can, of course, be used.

The chelating agent can be any chelate effective to sequester metal cations. Preferred chelating agents are EDTA (ethylene diamine tetracetic acid), water soluble salts of EDTA, nitrilotriacetic acid, and water soluble salts of nitrilotriacetic acid. The various sodium salts, e.g. mono-, di-, tri-, etc., of these acids are desirable. The salts are more soluble and so are more convenient to use. Of these materials nitrilotriacetic acid and its salts are best suited for the purposes of the invention, and the nitrilotriacetic acid tri-sodium salt is desirable. EDTA is highly effective, particularly the EDTA disodium salt. Other chelating agents which can be used are Versimine Flake brand chelating agent of Dow Chemical Company and which is reported to be disodium salt of hydroxyethyliminodiacetic acid; Chel brand chelating agents, of Geigy Chemical Corp., and Monaquest Cu chelating agent

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of Mona Industries, Inc., and which is reported to be copper dihydrogen EDTA.

The buffer compound can be any of the compounds known in the art for providing a pH in the range of about 7-11 in aqueous textile treating media. The phosphates are desirable and disodium phosphate (sodium phosphate dibasic, Merck Index, 7th ed., p. 954). Other phosphates which can be used are the glassy phosphates, i.e. sodium tetraphosphate, sodium hexametaphosphate. A pH about 7.5-8.5 is preferable and the disodium phosphate, sodium tetraphosphate and sodium hexametaphosphate are accordingly desirable. A pH of about 7.6-8.0 is best and disodium phosphate provides this pH. While material such as sodium carbamate and sodium sulfate can be used, they give higher pH than is preferred, e.g. they give pH of 9.5-10.5.

Regarding relative proportions for the materials, the textile oxidizing agent is preferably present in major proportion, i.e. in excess of the amount of the chelating agent and in excess of the amount of the buffer. The oxidizing agent can be about 50-90%, or better about 75-90%, and about 85% is particularly well suited.

The chelating agent can be present in minor proportions, i.e. less than the amount of oxidizing agent. A preferred proportion is from a fraction of a percent such as 0.05 to 5%, and about 1% is desirable. The optimum amount will depend on the particular chelating agent used. For EDTA and nitrilotriacetic acid compounds about 1% is desirable. The Monaquest Cu brand chelating agent of Mona Industries, Inc., is highly effective in relatively small amounts, e.g. about 0.1%. Larger amounts of chelating agent than 5% can be used, e.g. up to 15% or even more, but this is generally undesirable because though slight improvement in bleaching is realized by the use of larger amounts, the improvement is not enough to justify the corresponding increase in cost. Also, with some chelating agents, caking occurs if a large amount, e.g. over 5%, is used. This tends to cause loss of bleaching power for the composition.

As to the buffer, this can be present in minor proportions, i.e. less than the amount of oxidizing agent. It can be about 5-30%, and about 14% is desirable.

The invention is further described in examples below.

EXAMPLES

In these examples a Launderometer of the American Association of Textile Chemists and Colorists was used. Desized and boiled off greige goods (unbleached cotton) in the form of 9" x 7" swatches was subjected to a series of washings; each washing was 20 minutes at 140° F., the concentration of the compositions of the invention in media used in the tests was 0.27 g./600 ml. water. Further, said media contained 0.91 g./600 ml. of Tide brand synthetic detergent. Washings using Tide brand synthetic detergent in amount of 0.91 g./600 ml. water were used as the control. The extent of bleaching was measured with a Hunter Reflectometer (D-40), taking 4B-3G as the measure of whiteness, and the results are reported in percent of whiteness based on the whiteness for the control as 100%. The water used was tap water, and one series of washings was with water only.

The compositions were 85% sodium perborate, and the remaining 15% was composed of disodium phosphate and chelating agent. The sodium perborate was the tetrahydrate; the disodium phosphate was anhydrous. (The percentages, however, are on an anhydrous basis.) The identity and amount of chelating agent is set forth with the tabulation of results which follows. In the tabulation, NTA means nitrilotriacetate trisodium salt and the numeral following the term EDTA indicates the sodium salt, 2, 3, and 4, indicating respectively, the di-, tri-, and tetra-sodium salt.

Percent bleaching

Example	Chelating agent	Percent Chelating agent	Washing						
			I	II	III	IV	V	VI	VII
1	NTA	1	103.7	133.0	125.9	142.8	145.1	154.8	147.8
2	NTA	14	103.7	122.0	115.2	126.2	128.0	129.7	119.5
3	EDTA-4	1	103	128.3	119.5	135.9	137.3	145.5	137.1
4	EDTA-4	14	114.8	130.8	120.0	131.0	135.3	131.9	131.5
5	EDTA-3	1	109.8	129.5	118.2	132.2	142.2	146.3	141.2
6	EDTA-2	1	109.3	121.2	121.2	130.0	141.1	133.3	136.1
7	Control	0	100	100	100	100	100	100	100
8	Water	0	91	82.7	82.7	84.2	82.0	58.4	69.2

The textiles treated with the composition of the invention can be any material which is amenable to the action of the oxidizing agents as are used in the composition.

The composition is preferably supplied as a dry powder and can be combined with soaps, detergents and various additives as are commonly included in laundering compositions.

Percentages specified herein are weight percent on an anhydrous basis, unless otherwise indicated.

While various specific embodiments of the invention have been described, modifications and alterations will occur to those skilled in the art and it is intended that all such variations be secured by these Letters Patent and appended claim.

What is claimed is:

A composition consisting essentially of 85% of sodium perborate, 1% trisodium salt of nitrilotriacetic acid, and 14% of disodium phosphate for providing a pH of 7-11 in an aqueous medium.

References Cited by the Examiner

UNITED STATES PATENTS

2,576,205 11/1951 Apperson 252—99

FOREIGN PATENTS

721,317 4/1942 Germany.

OTHER REFERENCES

"The Condensed Chemical Dictionary," 6th ed., pp. 763, 1168, 1206.

"Sequestrene," Geigy Ind. Chemical, 1952, pp. 36, 48-49.

"Sodium Phosphate," by Monsanto, p. 35, September 1961.

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