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METHOD AND COMPOSITION FOR WASHING AND BLEACHING FIBROUS MATERIALS

Kurt Lindner, Berlin-Lichterfelde Ost, Germany, assignor to "Tepha" Gesellschaft für pharmazeutische und chemisch-technische Erzeugnisse m. b. H., Illertissen, Bavaria, Germany, a corporation of Germany.

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This invention relates to the manufacture of washing and bleaching materials containing active protecting agents whereby the SO_2 group is directly linked with a nitrogen atom of a basic nitrogen group.

The main object of the invention is to improve the quality of washing and bleaching materials containing active protecting agents selected from the class SO_2N, SO_2NH, SO_2NH_2. A further object is the preparation of washing and bleaching materials for a careful treatment of artificial, animal or vegetable fibres or fabrics made therefrom.

It is a further object of the invention to manufacture a washing and bleaching material having an alkaline reaction. Still other objects will appear hereinafter.

It has hitherto been proposed to subject textile fibres, yarns, fabrics or tricot of vegetable origin such as cotton, linen, jute fibre, ramie fibre or the like; or of artificial origin such as cellulosic material, staple fibre or rayon in wet processes to a treatment with active oxygen evolving compounds as, for instance, hydrogen peroxide, perborate, percarbonate or oxygen generating compounds such as bleaching powder, alkali hypochlorite or the like. Other oxygen evolving or generating compounds are sodium peroxide, perborates, percarbonates, perpyrophosphates but also chlorine bleaching agents, potassium permanganate or the like. The attack of the bleaching agent on the fibres results in the formation of oxycellulose or in a depolymerization of the cellulose leading to a loss of strength and weight. In washing and bleaching processes of household linen where oxygen is evolved or generated in the washing liquid by means of the so-called "automatic" washing materials, the same damages will be observed, especially after repeated treatments with these washing materials.

Even the atmospheric oxygen contained in the washing and bleaching baths exerts a slight attack on the fibres. This is probably due to the presence of traces of catalytically active metal compounds, such as for instance, copper, iron and manganese which are contained in the water or in the chemicals used.

Animal fibres, as for instance silk, wool, crude skins or furs, feathers and artificial fibres, particularly those of the polyamide type, are also often subjected to washing and bleaching processes and tend to decay when treated with peroxygen compounds. These attacks are particularly harmful when alkaline washing and bleaching materials are used because the generation of oxygen by hydrogen peroxide or other peroxygen compounds is irregular and violent in alkaline media.

In alkaline washing materials ammonia, alkali carbonates, alkali hydroxides, alkali orthophosphates, alkali silicates may conventionally be used. Besides these alkalis other bleaching and water softening agents such as anhydrous phosphates, for instance, sodium pyrophosphate, sodium tripolyphosphate, sodium tetrapolyphosphate, sodium hexametaphosphate or higher polymer alkali metaphosphates may also be present in the conventional washing and bleaching materials. In the washing process the presence of soap or other surface active substances is indispensable, for example, fatty alcohol sulfonates, alkyl sulfonates, alkyl aryl sulfonates, fatty acid condensation products or reaction products of ethylene oxide and alkyl phenoles, fatty acids, fatty alcohols or the like. It has been observed that even these surface active agents sometimes attack these fibres in alkaline washing and bleaching solutions.

In accordance with the invention it was found that compounds containing the SO_2 group directly linked with a N-atom are of particular advantage when used in a combined operation with the conventional bleaching and washing agents because the undesired generation of oxygen is stopped and the washing and bleaching processes may easily be controlled without an attack on the fibre. Very small amounts of these compounds are already effective but acting as detergents themselves they may also be used in larger quantities.

These stabilizing and active protecting agents contain the group SO_2N or SO_2NH or SO_2NH_2. They may be of an inorganic or organic nature; the organic compounds belong to the aliphatic, cyclo aliphatic, aromatic or heterocyclic type. The majority of these agents are water soluble in an alkaline medium. The water solubility, however, is not indispensable because even water insoluble agents of the types according to the invention may exert a stabilizing and protecting effect when used in finely divided form.

The useful agents of the inorganic type are:

Nitrilo sulfonic acid
Imido sulfonic acid
Amido sulfonic acid
Hydroxyl amin mono-sulfonic acid
Hydroxylamin disulfonic acid
Hydrazin monosulfonic acid

or their respective salts; compositions of sulfamides or sulfimides are also suitable.

The useful organic agents are characterized by a SO_2 group directly linked with a nitrogen atom, for example, benzene sulfamide or other aliphatic, cyclo aliphatic or aromatic sulfamides, formed by a reaction of sulfonic acid chlorides with ammonia and primary or secondary amines respectively. Of particular interest are the higher molecular alkyl aryl sulfamides, as for instance, dodecyl benzene sulfamide. Even the complex therapeutically valuable sulfonamides, for instance, sulfanil amidothiazol, 2-sulfonamidopyridine or para-amino benzene sulfacetylamide may be used. Owing to the strongly negative character of the $R—SO_2=$group nearly al these sulfonamides are soluble in aqueous alkaline solutions.

It was also discovered that condensation products of sulfochlorides with amino phenols, amino carboxylic acids or other amino compounds have the same properties as the described active protecting agents and may be used according to this invention; for example, the reaction products of sulfonic acids chlorides with amino acids, i. e. glycocoll, alanine, lysine, sarcosine; or high molecular amino acids or polypeptides as albumin decomposition products. Condensation products of an albuminous matter may also be employed according to the invention. Low molecular as well as high molecular sulfochlorides may be used accordingly.

In a preferred embodiment of the present invention condensation products of an albuminous matter may be used together with higher molecular sulfonic or sulfinic acids, for instance, paraffine sulfonic acids or alkyl aryl sulfonic acids; the aliphatic hydrocarbon chains of the latter acids correspond to those of the soap forming fatty acids and contain about 8 to 20 C atoms. These condensation products which may be used preferably in the form of their alkali salts are specially characterized by the

fact that they not only possess fibre protecting and stabilizing but also surface active and protective colloidal qualities. These products form soaplike aqueous strongly foaming solutions which have a considerable washing and dispersing effect.

The following examples are illustrative of my invention:

1. 1 liter of a washing bath containing about 4.5 grs. of soda, 1.2 grs. of waterglass, 1.6 grs. of a 62% alkyl sulfonate preparation and about 0.07 g. of active oxygen in the form of hydrogen peroxide is efficiently protected by an addition of about 0.1 g. of amidosulfonic acid. The washing liquid is therefore perfectly suited for a normal household boil washing process whereby even mixed fabrics containing staple fibre may be laundered. Instead of amidosulfonic acid imidosulfonic acid or nitrilosulfonic acid and their sodium or ammonium salts may also be used.

2. In a laundry where the washing process is, for instance, carried out in a copper washing boiler one liter of the washing liquid contains about 3.5 grs. of soda, 1 g. of sodium metasilicate and 1 g. of an active substance in the form of the sodium salt of dodecylbenzenesulfonic acid or in the form of a fatty alcohol sulfonate. The protection against the fibre weakening influence of oxygen is carried out by an addition of about 0.2 g. of paraaminobenzenesulfoneacetylamide per liter of the washing liquid. The white linen goods which may also be mixed with staple fibre are then subjected to a boil washing process which may be repeated frequently, if desired, without leading to damages of the fibre. The washing process may also be accomplished in the presence of 0.7 g. of sodium percarbonate or sodium perborate per liter of the washing liquid. No deleterious effect on the goods could be observed although even traces of copper were present in the washing liquid.

3. After a normal boil washing process the linen goods are rinsed and subjected to a mild bleaching aftertreatment in a warm solution containing about 0.8 g. of sodium perborate, 0.5 g. of sodium tetra polyphosphate and 0.1 g. of benzenesulfamide per liter of the washing liquid. Even delicate and fine fabrics withstood this treatment practically unharmed.

4. Mixed fabrics of staple fibre and cotton or staple fibre and wool or staple fibre and silk are subjected to a bleaching treatment with a solution containing about 25 cc. of a 30% hydrogen peroxide, 2 grs. of sodium pyrophosphate and 0.5 g. of a condensation product of an alkylsulfochloride with 12 to 16 C atoms in the alkyl rest and the sodium salt of methyl-aminoacetic acid. The bleaching process is carried out within a period of 4 to 6 hours at a temperature of about 30° to 40° C.

5. White or yellowish tinged goat skins are subjected to a dipping bleaching process whereby 60 cc. of hydrogen peroxide 30% per liter are used. This bleaching solution was buffered at a pH of 8 with ammonia. To this solution 1 g. per liter of a condensation product of an alkylated sulfochloridepeptide was added as a protective medium. After a treatment of 4 to 6 hours at a temperature of 30 to 35° C. the animal hairs are thoroughly bleached without involving a deterioration of the hair or the skin fibres. No carroting process is hereby necessary.

6. In a suitable mixer a washing powder is mixed which consists in about 56.0% of soda, 45% of water glass, 1.5% of cellulose sodiumglycolate, 10% of sodium perborate and 28% of a neutralized condensation product of paraffinesulfochloride and a moderately decomposed skin albumin. 5 grs. of this washing powder are dissolved in a washing liquid. Steeped white linen was boiled as usually in this washing liquid. The cleansing and bleaching effect was very good and a weakening of the strength of the fibre eventually caused by the attack of active oxygen could not be observed.

7. In a suitable mixer a washing powder is manufactured which contains about 50% of calc. soda, 3.5% of water glass, 1.5% of cellulosesodiumglycolate, 24% of a neutralized condensation product of alkylarylsulfochloride (12 to 16 C atoms) and a split off product of albumin of a moderate grade of cleavage, 9.0% of sodium percarbonate and 12.0% of sodium perpyrophosphate. The thus manufactured washing powder was used according to Example 6 for the laundering of linen. The protection against a deteriorating attack on the fibres was increased as compared with the composition of the washing powder described in the foregoing example. Instead of sodium pyrophosphate sodium tripolyphosphate or sodium hexametaphosphate may also be employed.

8. A mixture of 40 parts by weight of sodium pyrophosphate, 30 parts by weight of sodium percarbonate and 30 parts by weight of an albumine sulfonicacid condensate or an albumin sulfinic acid condensate is utilized in a concentration of 2 to 3 grs. per liter as a pre-cleansing, desizing or bleaching treatment of yarn, fabrics or tricot made from cotton, viscose rayon, copper rayon or acetate rayon. The treatment starts with a temperature of about 30° C. and is gradually continued until a temperature of about 85° to 90° C. is obtained. Weakening of the fibres caused by oxidation is not to be feared.

9. Mixed textures of staple fibre and cotton or staple fibre and wool or staple fibre and silk were bleached in a solution of hydrogen peroxide containing about 25 grs. of hydrogen peroxide 30%, 2 grs. of sodium pyrophosphate and 1 g. of sulfinic acid albumin condensate per liter. Instead of this condensation product a mixture of 50 parts by weight of this condensation product and 50 parts by weight of the sodium salt of dodecyl sulfonic acid may also be utilized.

It will be understood that wide latitude is permissible in the practice of the invention as special bleaching and oxidation processes according to the invention do not only take place in washing or color lightening but may also be combined with desizing processes, or dyeing and calico printing or with an aftertreatment of the fibres after dyeing and calico printing and the like. Following a bleaching process with chlorine oxygen containing solutions according to the invention may be used as an anti chlorine means. In all these cases the active protecting agents as described in the present invention have been found eminently suitable as to the desired purposes.

The terms and expressions used herein are to be regarded as terms of description and not of limitation.

What I claim is:

1. A method for washing and bleaching fibrous materials susceptible to attack by oxygen in alkaline washing liquids which comprises washing and bleaching such materials in an alkaline washing liquid containing an active oxygen evolving compound and a protective compound containing an SO_2 radical connected directly with a nitrogen atom of a basic nitrogen group selected from the group consisting of sulfonamides of amino carboxylic acids, peptides and albumen cleavage products.

2. A method according to claim 1, in which said active oxygen evolving compound is a peroxygen compound.

3. A method according to claim 2, in which said alkaline washing liquid contains an alkali metal phosphate.

4. A method according to claim 1, in which said protective compound is a sulfonamide of an amino carboxylic acid.

5. A method according to claim 1, in which said protective compound is a sulfonamide of a peptide.

6. A method according to claim 1, in which said protective compound is a sulfonamide of an albumen cleavage product.

7. A method according to claim 1, in which said protective compound is an alkyl sulfonamide of an albumen cleavage product, the alkyl group of which contains 8 to 20 carbon atoms.

8. A method according to claim 1, in which said protective compound is an alkyl aryl sulfonamide of an al-

bumen cleavage product, the alkyl group of which contains 8 to 20 carbon atoms.

9. A method according to claim 1, in which said protective compound is a dodecyl benzene sulfonamide of an albumen cleavage product.

10. A washing and bleaching composition comprising an alkaline detergent, a peroxygen compound and a protective compound containing an SO_2 radical connected directly with a nitrogen atom of a basic nitrogen group selected from the group consisting of sulfonamides of amino carboxylic acids, peptides and albumen cleavage products.

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