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PROCESS FOR BLEACHING NATURAL AND ARTIFICIAL FIBRES AND FIBRES OF VEGETABLE ORIGIN AND FREE FROM INCRUSTATIONS

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The present invention relates to an improved process for bleaching natural and artificial fibres and fibre substances which are of vegetable origin and free from incrustations, for example cotton, linen, ramie, artificial fibres produced from regenerated cellulose, such as artificial silk or cellulose wool, or from cellulose esters or ethers, and products produced therefrom, such as yarns, mixed yarns, fabrics and the like, with the aid of bleaching agents yielding oxygen, such as hydrogen peroxide, sodium peroxide, perborate and others.

On bleaching fibres and fibre substances of the above mentioned kind such as cotton, linen, artificial silk, cellulose wool and the like, with bleaching agents containing active oxygen, the desired bleaching effect can occasionally not be obtained in spite of the employment of relatively high quantities of bleaching agents. Hence it is usual, when bleaching linen and similar fibre substances in peroxide baths, to subject the goods to an after-treatment by weak chlorination and acidification in order to remove the last yellowish traces. Similarly it is usual to subject cotton and cotton goods bleached with peroxide to further after-treatments, for example to treatment with hydrosulphite, acidification etc. so as to improve their appearance.

It has now been found that, when vegetable fibres of the type which is free from incrustations and products produced therefrom are to be bleached with bleaching agents giving off oxygen, the effects of the bleaching bath may be considerably improved without increase in the quantity of bleaching agents employed, if suitable quantities of alkali salts, including ammonium salts, of aliphatic polycarboxylic acids such as succinic acid, tartaric acid, citric acid, maleic acid are incorporated in the baths. Alkali salts of oxalic acid have proved particularly suitable. Relatively small quantities of the said salts suffice for obtaining the improved bleaching effects, for example from about 3 to about 6 gms per litre of bleaching bath, or if desired somewhat more. Instead of or in addition to alkali or ammonium salts, free carboxylic acids may also be added to the alkaline bleaching baths, for example to baths produced from sodium peroxide, and the salts improving the bleaching effect of the baths may be produced in desired quantities from these carboxylic acids.

According to the invention, baths containing alkali salts of polycarboxylic acids may be employed for bleaching vegetable fibres and fibre substances of the type which are free from incrustations, the normally usual or necessary after-treatments such as chlorination, treatment with hydrosulphite, acidification and the like being omitted. When, for example, linen is bleached according to the above process it comes out of the peroxide bath so clear and white that the previously usual subsequent chlorination and acidification is superfluous. Similarly, when bleaching cotton by the above process, so pure and clear a white is obtained that the previously usual after-treatments, such as hot soaping, hydrosulphite treatment, acidification and the like may be omitted.

Bleaching baths which, in addition to oxygen-yielding substances and if desired other substances, also contain salts of oxalic acid or alkali salts of polycarboxylic acids are known per se. It is, for example, known to employ oxalate-containing baths for bleaching animal fibres, such as wool. It is further known to bleach straw, i. e., a heavily incrusted vegetable material, with peroxide baths which contain large quantities of oxalate. Nevertheless it has not hitherto been suggested, nor was it evident to those skilled in the art that fibres and fibre substances of vegetable origin of the type which is free from incrustation could be bleached by employing oxygen-containing baths contalning definite quantities of alkali oxalate and the like, the hitherto usual after-treatments being omitted, nor that a bleached product of entirely satisfactory character could be obtained by such a process. It was not to be expected that on bleaching vegetable fibrous substances of the type which is free from incrustation and which possesses considerable resistance to alkali and which in general is also bleached with alkali baths, special effects would be obtained by addition of organic salts of the kind specified. It was therefore all the more surprising that the presence of even relatively small quantities of oxalate or like salts should produce such particularly favourable effects; this fact can only be explained by the hypothesis that in this case it is a matter of different processes than in straw bleaching or in the bleaching of animal fibres. It seems as if certain impurities of the fibre, which cannot be destroyed or removed by the oxidising action of the bleaching agent, are dissolved or rendered innocuous by the presence of oxalate or the like in the bath. The behaviour of certain fibres produced from viscose which, apparently because of the presence of non-bleachable impurities coming from the manufacturing process, cannot or can only with difficulty be bleached by use of an oxygen or chlorine

bleach, is for example characteristic. Such fibres can be bleached according to the present process with excellent results, probably because the non-bleachable impurities are dissolved out, or rendered innocuous in other manner, by the action of the salt, for example alkali oxalate, added to the bath.

In order that the invention may be well understood the following examples thereof are given by way of illustration only.

1. 200 gms of cotton yarn are treated for 4 hours at 85–90°C in 1200 ccs of a bleaching bath which contains per litre:

H_2O_2 40%	ccs	4
Caustic soda	gms	2
Waterglass 38–40° Bé	ccs	4
A wetting agent produced by proteolysis, known by the trade name "Lampeon A"	gm	1
Sodium oxalate	gms	5

A control sample treated without addition of sodium oxalate come out of the bleaching bath dirty and grey, whilst the sample bleached with addition of oxalate had a much clearer and cleaner appearance.

2. 200 gms of linen yarn No. 20 are treated according to the following directions:

(*a*) Scald in 1200 ccs of scalding bath containing 20 gms of soda and 1 gm of caustic soda for 5 hours at 90° and then soak.

(*b*) Chlorinate in 1200 ccs of chlorinating bath with 7 gms of active chlorine per litre for 2 hours at 18°C and then soak.

(*c*) Acidify with 1200 ccs of an acidification bath containing 2 ccs of sulphuric acid 66° Bé. and 1 gm of sodium bisulphate per litre for ½ hour, then soak.

(*d*) Peroxide bath: 1200 ccs bleaching bath contalning per litre

I. With oxalate

5 gms. sodium peroxide 6 gms. crystallised oxalic acid 4 ccs. waterglass 38–40° Bé.	=6.7 gms. sodium oxalate per litre

II. Without oxalate

Sodium peroxide	gms	5
Sulphuric acid 66° Bé	gms	4.81
Waterglass 38–40° Bé	ccs	4

Treatment for both samples: 3 hours at 75°C, 3 hours at 80°C, then rinse.

Result: Sample I (with oxalate) is a clearer and purer white than sample II (without oxalate) which has a yellow appearance. Sample II must be further weakly chlorinated and acidified in order to be as white as I.

3. 200 gms of cellulose wool fabric (viscose cellulose wool) are undressed and then treated for 5 hours at 75–80°C in 100 ccs of a peroxide bath which contains per litre

H_2O_2 40%	ccs	3.6
Caustic soda	gm	1
Waterglass 38–40° Bé	ccs	4
Sodium oxalate	gm	5

and finally rinsed.

A control sample treated without addition of sodium oxalate shows a considerably worse bleaching effect.

The sample bleached with addition of sodium oxalate was perfectly bleached.

4. 200 gms of artificial silk yarn (viscose were treated for 3 hours at 70°C in 200 ccs of a bleaching bath consisting of

		Per liter
H_2O_2 40%	ccs	3
Sodium pyrophosphate	gms	3
Sodium succinate	gms	5

and then rinsed. The bleaching effect was very good.

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