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PROCESS FOR PRODUCING PRINTS AND DYEINGS WITH ESTER SALTS OF LEUCO VAT DYESTUFFS

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The method for printing and dyeing with ester salts of leuco vat dyestuffs consists in applying these bodies in the form of watery solutions, bringing the solutions onto the fibre and subjecting the same to an acid oxidation, whereby the vat dyestuff is regenerated in a very fine division and so that the dyeing is developed.

The color can be developed by means of special developing baths (see U. S. A. Patent 1,575,958). The development can also be carried out by steaming with the aid of an appropriate oxidizing agent in the presence of a substance yielding acid in the heat (see U. S. A. Patent 1,747,107).

According to the process described in British Patent 356,577, aluminium chlorate, which acts at the same time as oxidizing and as acid yielding agent, and which enables the development of colors of leuco ester salts also without steaming, is used. To this effect, the goods are at first padded with a solution of tartaric acid and ammonium vanadate, and dried. Then they are printed with a printing color containing a leuco ester salt and aluminium chlorate. Finally, development is effected by simply hanging the goods at room temperature.

It has now been found that this process can be simplified by printing or padding the goods with a color containing a leuco ester salt, ammonium chlorate and ammonium vanadate or ammonium chlorate, ammonium persulphate and ammonium vanadate, the latter being added as a catalyst. Ammonium persulphate is employed in addition to ammonium chlorate in cases where the ester salts of leuco vat dyestuffs used are developed only with difficulty. Here also the development of the color is operated by simply hanging the goods at an ordinary or slightly raised temperature. But in this case, the pre-treatment of the fibre, that is to say the padding of the same with a solution of tartaric acid and ammonium vanadate before applying the printing color, is not necessary.

This new method, whereby the pre-treatment of the goods can be dispensed from, represents a real improvement, compared with the processes applied so far.

The new process is especially suitable for cotton printing. The printing colors do not contain neither copper, nor any other heavy metal salts, which might attack the doctor or lead to some other trouble. Besides, the colors have a goods stability, and the shades obtained in this way are well developed.

The new process may also be used for padding, whereas the process applied hitherto was only suitable for printing purposes.

The persulphuric acid and the chloric acid can be used in the form of any other soluble salt, without influencing the effect, so long as the formation of the ammonium salts of such acids in the printing paste or in the padding liquor is guaranteed (e. g. sodium chlorate and ammonium chloride).

The following examples may illustrate the new process, the parts being by weight:

	Examples	1	2	3	4	5	6
1	Estersalt of leucobenzoquinone-di-para-chloranilide	6					
2	Estersalt of leucodibenzpyrenequinone		5				
3	Estersalt of leucodibromo-dibenzpyrenequinone			6			
4	Estersalt of leuco-6-ethoxy-4'-methyl-6-chloro-thioindigo				6		
5	Estersalt of leuco-6:6'-diethoxy-thio-indigo					8	
6	Estersalt of leuco-4:4'-dimethyl-6:6'-dichloro-thioindigo						2
	Ethylene-thioglycol	6	5	10	5	6	10
	Phenol		5	5	5		5
	Urea		5	5	5		5
	Hot water	23	25	7	21	28	13
	Starch-tragacanth thickening	60	50	50	50	50	50
	At 50° C. are added:						
	Solution of ammonium chlorate (15° Bé.)	4	4	8	5	3	8
	After cooling down a solution is added containing:						
	1 part of ammonium persulphate, 1 part of ammonia (20%), 2 parts of water			4	2	4	2
	Solution of ammonium vanadate (1%)	1	1	5	1	1	5
		100					

	Examples	7	8	9	10	11	12
7	Estersalt of leuco-4:4'-dimethyl-6:6'-dichloro-thioindigo	6					
8	Estersalt of leuco-7:7'-dimethyl-6:6'-dichloro-thioindigo		6				
9	Estersalt of leuco-7:7'-dimethyl-5:5'-dichloro-thioindigo			4			
10	Estersalt of leuco-5:6:7-trichloro-thio-naphthene-5':7'-dichloro-indole-indigo				8		
11	Estersalt of leuco-2-anthracene-2-indole-dibromindigo					5	
12	Estersalt of leuco-4:5:7:4':5':7'-hexabromindigo						5
	Ethylenethioglycol	6	6	10	6	6	6
	Phenol	3	3	5	3		3
	Urea	2	2	5	2		2
	Hot water	9	12	2	7	22	17
	Starch tragacanth thickening	50	50	50	50	50	50
	At 50° C. are added:						
	Solution of ammonium chlorate (15° Bé.)	15	12	15	15	8	8
	After cooling down a solution is added containing:						
	1 part of ammonium persulphate, 1 part of ammonia (20%), 2 parts of water	4	4	4	4	4	4
	Solution of ammonium vanadate (1%)	5	5	5	5	5	5
		100					

	Examples	13	14	15	16	17	18
13	Estersalt of leuco-5:7:5'7'-tetrabromindigo	5					
14	Estersalt of leuco-5-bromindigo		6				
15	Estersalt of leucoindigo			5			
16	Estersalt of leucodimethoxy-dibenzanthrone				8		
17	Estersalt of leucobromo-1-chloro-2:3-naphthindole-2:2'-p-methoxy-naphthalene-indigo					8	
18	Estersalt of the leuco-vat dyestuff from α-isatinanilide and 1-methyl-7:8-oxybenzocarbazole						12
	Ethylenethioglycol	6	6	6	6	5	6
	Phenol	3		3		5	3
	Urea	2		2		5	2
	Hot water	17	25	25	30.5	18	10
	Starch tragacanth thickening	50	50	50	50	50	50
	At 50° C. are added:						
	Solution of ammonium chlorate (15° Bé.)	8	8	4	4	5	8
	After cooling down a solution is added containing:						
	1 part of ammonium persulphate, 1 part ammonia (20%), 2 parts of water	4	4	4		3	4
	Solution of ammonium vanadate (1%)	5	1	1	1	1	5
	Ammonia (20%)				0.5		
		100					

The cotton is printed with these printing colors and dried.

The material is then allowed to hang overnight, preferably at a temperature of 40–50° C. If the material is allowed to hang at ordinary temperature, one night only will not be sufficient. In this case, the duration of the hanging up should be prolonged to 48 hours.

Example 19

The material to be dyed is padded in a bath containing:

	Parts
Estersalt of leuco-4:4'-dimethyl-6:6'-dichloro-thioindigo	20
Ethylenethioglycol	100
Phenol	50
Urea	50
Hot water	580
Tragacanth thickening	50
At 50° C. are added:	
Solution of ammonium chlorate (15° Bé.)	80
After cooling down a solution is added containing:	
1 part of ammonium persulphate, 2 parts of water	20
Solution of ammonium vanadate (1%)	50
	1000

After padding, the material is dried and developed, as described in the above printing processes.

What I claim is:

1. A process for producing prints or dyeings by means of ester salts of leuco vat dyestuffs, comprising applying on the goods, without pre-treatment thereof, a dye composition that contains, besides the leuco ester salt of the vat dyestuff, ammonium chlorate and ammonium vanadate, the latter being added as catalyst, and then developing the color by hanging the goods at ordinary or slightly increased temperature.

2. A process for producing prints or dyeings by means of ester salts of leuco vat dyestuffs, comprising applying on the goods, without pretreatment thereof, a dye composition that contains, besides the leuco ester salt of the vat dyestuff, ammonium chlorate, ammonium persulphate and ammonium vanadate, the latter being added as catalyst, and then developing the color by hanging the goods at ordinary or slightly increased temperature.

3. A process for producing prints or dyeings by means of ester salts of leuco vat dyestuffs, comprising applying on cotton goods without pretreatment thereof, a dye composition that contains, besides the leuco ester salt of the vat dyestuff, ammonium chlorate, ammonium persulphate and ammonium vanadate, the latter being added as catalyst, and then developing the color by hanging the cotton goods at ordinary or slightly increased temperature.

4. A process for producing prints or dyeings by means of ester salts of leuco vat dyestuffs, comprising applying on the goods, without pretreatment thereof, a dye composition that contains the ester salt of leuco-dibenzpyrenequinone, ammonium chlorate and ammonium vanadate, the latter being added as catalyst, and then developing the color by hanging the goods at ordinary or slightly increased temperature.

5. A process for producing prints or dyeings by means of ester salts of leuco vat dyestuffs, comprising applying on the goods without pretreatment thereof, a dye composition that contains the ester salt of leuco-dibromo-dibenzpyrenequinone, ammonium chlorate, ammonium persulphate and ammonium vanadate, the latter being added as catalyst, and then developing the color by hanging the goods at ordinary or slightly increased temperature.

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