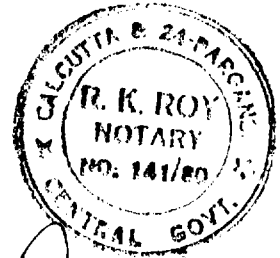


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ABSTRACT



1 The invention concerns a carbonless
2 copy paper and its various aspects.

3 Thus it provides a pressure-sensitive
4 colour transfer sheet containing electron
5 donating substantially cluster free microcap-
6 sules of colorformer and a colour accepting
7 sheet containing electron accepting colour
8 developer which is a water soluble graft copoly-
9 mer having backbone of carboxymethyl cellulose/
10 gum arabic and side chains of polyacrylic
11 or polymethacrylic acid.

12 The carbonless copy paper color transfer
13 system comprises the pressure sensitive colour
14 transfer sheet and one or more of said colour
15 accepting sheets.

16 The invention also covers the process
17 of preparing colour former microcapsules by
18 dissolving acid treated gelatin in warm water,
19 emulsifying alkyl naphthalene containing crystal
20 violet lactone in the gelatin solution adding
21 one or more of thickening agents to the emul-
22 sion and diluting with warm water to a pH
23 of 5.0 - 5.5 which is adjusted to 10 with
24 dilute aqueous alkali and adding cellulose
25 powder, starch and partially hydrolysed poly-
26 vinyl alcohol.

27 The invention also proposes method of
28 preparing a colour developer which comprises
29 dispersing silica and kaolin in water to which
30 p-phenyl phenol formaldehyde, oxidised aqueous
31 starch solution and SBR latex are added and
32 mixed.

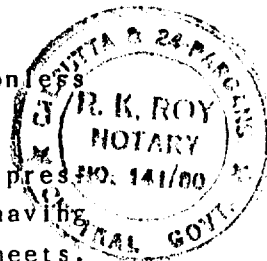
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1 This invention relates to carbonless
2 copy paper.

3 Carbonless copy paper is really a pres-
4 sure sensitive colour transfer system having
5 color transfer and colour developer sheets.

6 This invention also includes process
7 of preparation of colour former microcapsules
8 for the carbonless copy paper and the micro-
9 capsules so produced.

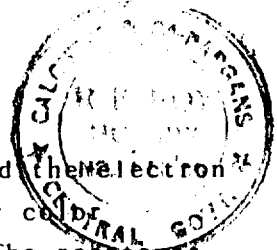
10 The present invention further includes
11 a process of preparation of colour developer
12 for the colour transfer system used in carbon-
13 less copy paper and the colour developer.

14 The invention also encompasses process
15 of making the carbonless copy paper, color
16 developer sheet and color developer system.

17 Carbonless copy paper usually consists
18 of two or more sheets of coated paper. For
19 example, when three sheets of paper are used,
20 the top sheet has a coated back (CB) which
21 is formed by coating in the back or underside
22 of the top sheet with a composition containing
23 microcapsules which is prepared by dispersing
24 an oil containing a colorless electron donating
25 chromogenic color former in a hydrophilic
26 colloid solution. The middle sheet is coated
27 on its front and back (CFB). The coating on
28 the front or upperside contains an electron
29 accepting color developer, and the coating
30 on the back or underside is the same as the
31 microcapsule-containing coating on the top
32 sheet. The bottom sheet is coated on its upper-
33 side or front (CF) with the same composition
34 that is on the front of the middle sheet. Deta-
35 iled disclosures of carbonless copy papers
36 are included in U.S. Patents 3,554,781;
37 4,154,462; 4,337,968; 4,352,855; 4,371,634
38 and 4,441,451.

39 In order to form an image with carbonless
40 copy paper, the system utilizes the color
41 forming reaction that takes place between
42 the electron donating chromogenic material

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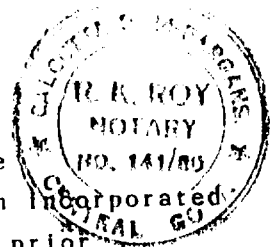


1 or color former in the coated back and then the electron
2 accepting acidic reactant material or color former
3 developer in the coated front (CF). The reactants
4 are isolated from each other by microencapsulating
5 one of them until an image is desired. When pressure
6 is applied to the carbonless copy paper, the
7 microcapsules are ruptured and a reaction occurs
8 between the color former and color developer to
9 provide the desired image. In the preferred type
10 of carbonless copy paper, the color former is
11 the reactant that is encapsulated by being dissolved
12 in oil and microencapsulated prior to being used
13 in the coating on the coated back.

14. A preferred method of making microcapsules
15 containing color former reactants is the complex
16 coacervation procedure described in U.S. Patent
17 2,800,457. In this procedure an oil containing a
18 color former is dispersed in two colloid materials
19 that have opposite charges, and at least one is
20 gellable. Coacervation of the hydrophilic colloid
21 solution around each oil droplet is caused by
22 dilution and adjusting the pH to the acidic range.
23 The coacervate around each oil droplet is gelled
24 by cooling and hardened by addition of a suitable
25 hardening agent, and the pH of the mixture is
26 adjusted to the alkaline range.

27 Carbonless copy papers that are produced
28 from multi-nuclear and clustered microcapsules
29 are subject to premature rupturing of the
30 microcapsules during handling or during post-
31 coating conversion processes, especially in the
32 printing of business forms. Also, such copy
33 papers have very poor humidity and heat resistance,
34 and those copy papers have only very limited
35 utility in hot, humid climates. Much effort has
36 been expended to solve these problems by preparing
37 coacervation microcapsules that are mononuclear

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1 and cluster-free. For example, maleic anhydride
2 copolymers or carboxymethyl cellulose have been incorporated
3 into the walls of the microcapsules, but these prior
4 art procedures have not been successful, although reaction
5 conditions were strictly maintained during the
6 coacervation procedure.

7 Also, there are unsolved problems with the coated
8 fronts that are used in prior art carbonless copy papers.
9 Usually an acidic clay or an acidic polymer is used in
10 the coated front. Images on acidic clay-coated paper are
11 not sufficiently permanent and they have only limited
12 resistance to moisture. Images on acidic polymer-coated
13 paper are time and temperature dependent and frequently
14 too slow. Better results are sometimes obtained by using
15 a combination of acidic clay and acidic polymer, but image
16 formation is still too slow, especially at low temperatures
17 such as at 5°C.

18 SUMMARY OF THE INVENTION

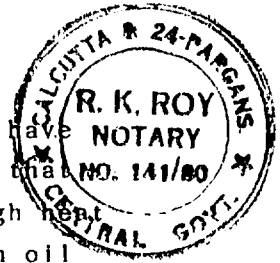
19 It is an object of this invention to provide an
20 improved carbonless copy paper that does not have the
21 problems and disadvantages discussed above.

22 It is another object of this invention to
23 provide an improved carbonless copy paper having the
24 color former in microcapsules that are mononuclear and
25 substantially cluster-free and are resistant to premature
26 rupturing, especially at high humidity and high
27 temperature.

28 It is a further object of this invention to
29 provide an improved carbonless copy paper having a faster
30 image formation capability, especially at low
31 temperatures.

32 DETAILED DESCRIPTION

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1 In accordance with this invention, we have
2 found that an improved carbonless copy paper that
3 has an improved resistance to smudging at high heat
4 and humidity can be prepared by dispersing an oil
5 containing an electron donating chromogenic color
6 former in a hydrophilic colloid solution to form
7 microcapsules that are mononuclear and cluster-free.
8 The hydrophilic colloid solution contains a water
9 soluble graft copolymer having a backbone of carboxymethyl
10 cellulose or gum arabic and side chains of polyacrylic
11 acid or polymethacrylic acid, said side chains comprising
12 from 5 to 10 per cent by weight of the copolymer.

13 The hydrophilic colloid solution is coated on
14 one side of a sheet of paper to form a pressure-sensitive
15 color transfer sheet, and the color transfer sheet is
16 placed in contact with an electron accepting color
17 developer that has been coated on a second sheet of
18 paper. The resulting system is a pressure-sensitive
19 carbonless copy paper that is resistant to smudging
20 at high temperature and high humidity.

21 We have also found that the image response
22 time of the second sheet of paper containing the
23 color developer can be improved, particularly at low
24 temperatures, such as 5°C, by incorporating pectin
25 or sulfated starch in the acidic coating containing the
26 color developer.

27 The coacervation procedure that is described
28 in U.S. Patent 2,800,457 is suitable for preparing
29 the microcapsules containing color forming material
30 that are used in preparing the carbonless copy paper
31 of this invention. The preferred hydrophilic or
32 colloid material that is used is an acid-treated gelatin;
33 and in order to obtain mononuclear, cluster-free
34 microcapsules, a graft copolymer is used with the
35 acid-treated gelatin.

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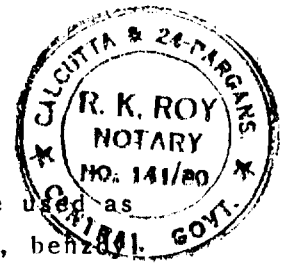
1 The graft copolymer contains carboxymethyl
2 cellulose (CMC) or gum arabic (GA) as a backbone and
3 polyacrylic acid or polymethacrylic acid in the
4 side chains. The graft copolymers are carboxymethyl
5 cellulose with polyacrylic acid (CMC-PAA) or
6 polymethacrylic acid (CMC-PMA), and gum arabic with
7 polyacrylic acid (GA-PAA) or polymethacrylic acid
8 (GA-PMA).

9 The graft copolymers that are used contain
10 from 5% to 10% by weight of polyacrylic acid (PAA)
11 or polymethacrylic acid (PMA). When less than 5%
12 by weight is used, the benefits of our invention
13 are not achieved; and when more than 10% by weight
14 is used, the microcapsules have been found to
15 agglomerate.

16 The amount of copolymer that is used, when
17 expressed in relation to the amount of gelatin or
18 other hydrophilic colloid material, is within the
19 range of 1/8 to 1/4 or 12.5% to 25% by weight.

20 The graft copolymers that are used can be
21 prepared by a free radical polymerization technique.
22 Free radicals are created on the carboxymethyl
23 cellulose or gum arabic backbone by higher valence
24 metallic ions, and the acrylic acid or methacrylic
25 acid monomers are polymerized mainly on the chain
26 of the substrate polymer. The graft copolymers can
27 then be purified by the solvent-nonsolvent technique.

28 The carboxymethyl cellulose that is used
29 to form the graft copolymers has an average degree of
30 polymerisation (DP) of 200-500 and a degree of
31 substitution (DS) of 0.6 to 0.8. Commercial grades
32 of gum arabic, acrylic acid, and methacrylic acid
33 are also used.



1 Chromogenic materials that can be used as
2 color formers are crystal violet lactone, benz
3 leucomethylene blue, malachite green lactone,
4 rhodamine B-lactone, and fluoran derivatives, either
5 alone or in combination.

6 Conventional hydrophobic materials are used,
7 either alone or in combination. Typical examples are
8 castor oil, alkyl diphenyl, biphenyl derivatives,
9 naphthalene derivatives, alkylbenzene phthalic acid
10 esters, and kerosene.

11 Coacervate hardening agents are also used,
12 either alone or in combination. Suitable agents are
13 formaldehyde, glyoxal, and glutaraldehyde. From 3-30
14 parts by weight of hardening agent per 100 parts of
15 hydrophilic colloid material are used.

16 The preferred color developers are acidic
17 polymers of thermoplastic materials having good
18 solubility in oil. A preferred polymer is p-substituted
19 phenol-formaldehyde novolac resin. The resin can be
20 used in combination with an absorbent such as kaolin,
21 attapulgite, and precipitated silica. In the polymer
22 p-chloro phenol, p-octyl phenol, or p-tertiary butyl phenol
23 can be used in place of p-phenyl phenol.

24 Binders that can be used with the color
25 developers are polyvinyl alcohol, styrene-butadiene
26 rubber (SBR) latex, carboxymethyl cellulose, hydroxyethyl
27 cellulose, oxidized starch, and polyvinyl acetate
28 emulsion. The most preferred binders are oxidized
29 starch and styrene-butadiene rubber latex.

30 Anionic, cationic, and nonionic emulsifying
31 agents can also be used with the color developer.
32 Preferred emulsifiers are teepol, turkey red oil,

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1 tetrasodium pyrophosphate, cetyltrimethyl ammonium
2 chloride, and polyoxyethylene dodecyl sulfonic acid.
3 Suitable protective agents for the color developer
4 are pectin, pectic acid, dialdehyde starch, sulfated
5 starch, and ureaformaldehyde polymers. Sulfated starch
6 and pectin are preferred.

7 The amount of pectin or sulfated starch that
8 is used is within the range of 3 to 8% by weight of
9 the color developer, for example, p-phenyl phenol
10 formaldehyde resin. When sulfated starch is used, it
11 is preferred that the degree of esterification be
12 within the range of 0.55 to 0.65.

13 The following examples illustrate our invention.
14 In these examples, parts and percentages are by
15 weight unless otherwise indicated.

16 Preparation of Color Former Microcapsules:

17 Example I

18 100 parts acid treated gelatin is dissolved in 1200
19 parts water at 45°C and 600 parts KMC-113 (alkylnapthalene)
20 containing 12 parts crystal violet lactone is emulsified
21 into the gelatin solution to a particle size of 5-8 μ .
22 To the emulsion, 1000 parts 2.5% CMC solution (DP=300
23 & DS=0.6) in water is added gradually under mild
24 stirring. Then 3000 parts warm water are added and
25 stirred for another 15 minutes. The pH of the mixture
26 is adjusted to 5.0-5.5 with 10% sodium hydroxide in
27 water. The mixture is then cooled externally under
28 constant stirring and 50 parts of formaldehyde (37%)
29 is added to it. The pH of the system is then adjusted
30 to 10.0 with 10% sodium hydroxide solution.

31 Example II

32 Example I is repeated by using a CMC (DP=300 & DS=0.6)-



1 graft copolymer containing 10% PAA, instead of
2 alone.

3 Example III

4 Example I is repeated by using a CMC (DP=300 & DS=0.6)-
5 graft copolymer containing 10% PMA, instead of using
6 CMC alone.

7 Example IV

8 Example I is repeated by using 100 parts of gum arabic
9 (GA) in place of carboxymethyl cellulose (CMC).

10 Example V

11 Example I is repeated by using a GA-graft copolymer
12 containing 10% PAA in place of CMC alone.

13 Example VI

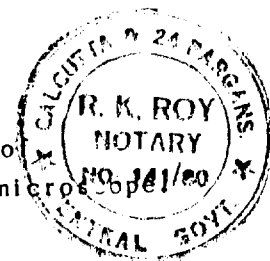
14 Example I is repeated by using GA-graft copolymer
15 containing 10% PMA in place of CMC alone.

16 To each of the above capsule dispersions,
17 150 parts cellulose powder, 75 parts starch, and 200
18 parts 10% partially hydrolysed polyvinyl alcohol are
19 added and the final composition coated at 5 g/m²
20 onto a 50 g/m² base paper.

21 The coated papers with microcapsules (Examples
22 I-VI), i.e. the CB sheets, are tested by using the
23 following procedures and the results are presented
24 in the comparative analytical table (Table I).

25 Test Procedures:

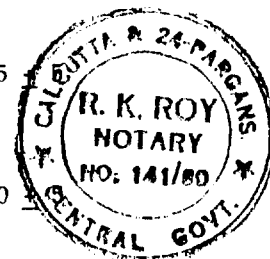
26 (i) Capsule nature and cluster
27 This test is done with a microscope of 1500x
28 magnification by taking capsule suspensions



- 1 onto a slide and counting the number of
2 clusters per 100 capsules under the microscope.
- 3 (ii) Heat and humidity resistance
4 Coated papers from the capsule suspensions
5 are kept in an air oven at $150^{\circ} \pm 2^{\circ}\text{C}$ for
6 testing heat resistance and in a humidifier at 50°
7 $\pm 0.5^{\circ}\text{C}$ and 98% RH for testing the humidity
8 resistance.
- 9 (iii) Humidity resistance under weight
10 This is considered to be a measure of the
11 smudge resistance of the carbonless paper.
12 Coated papers from the capsule suspensions (CB)
13 are placed on the CF coated papers face to
14 face, under weight in a humidifier at $50^{\circ} \pm$
15 0.5°C and 98% RH.
- 16 (iv) Hardening time
17 This is the time required for dropwise addition
18 of a sodium hydroxide solution in water to
19 make the pH of the prematured capsule
20 suspension at 10°C reach the range of
21 10.0-10.5.

22 TABLE I
23 Comparative Analytical Table (CB)

Comparative Analytical Table (C3)						
Example	Capsule Shape	Cluster/Heat 100	Humidity Resis-	Humidity Resis-	*Humidity Resistance	Hardening Time
		Capsules	tance	tance	under Weight	(minutes)
1	2	3	4	5	6	7
I	Mixture of Multi-nuclear & Nononuclear	15 ± 5	4 hrs. at 150°C	1/2 hr. @ 50°C & 98% RH for 1/4 hr.	1/4 Kg/in ² @ 50°C & 98% RH	40 ± 5
II	Nononuclear	1	7 hrs. at 150°C	1 hr. @ 50°C & 98% RH for 1/2 hr.	1/2 Kg/in ² @ 50°C & 98% RH	15 ± 5
III	Nononuclear	1	7 hrs at 150°C	1 hr. @ 50°C & 98% RH for 1/2 hr.	1/2 Kg/in ² @ 50°C & 98% RH	15 ± 5



1	IV Multi-nuclear	25 ± 5	3 hrs	1/2 hr.	1/4 Kg/in ² @	45
2			at	@50°C	50°C & 98% RH	
3				150°C	& 98% RH for 1/4 hr.	
4	V Mononuclear	5 ± 2	6 hrs.	1 hr.	1/2 Kg/in ² @	20
5			at	@ 50°C	50°C & 98% RH	
6				150°C	& 98% RH for 1/2 hr.	
7	VI Mononuclear	5 ± 2	6 hrs.	1 hr.	1/2 Kg/in ² @	20 ± 5
8			at	@50°C	50°C & 98% RH	
9				150°C	& 98% RH for 1/2 hr.	

10 This test has been done by keeping both weight
11 and time as variables.

12 It is observed that for Examples II, III, V, and
13 VI, the resistance is almost four times (giving equal
14 emphasis to weight and time) that of Examples I and IV.

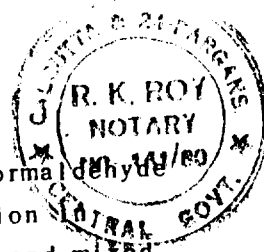
15 The following observations are found with the CB
16 coated papers and the microcapsules used for making
17 the CB sheets according to the process of the invention
18 (Examples II, III, V, and VI):

- 19 (i) The average capsule size is 5-8 μ .
- 20 (ii) For all practical purposes, the microcapsules
21 are mononuclear and cluster-free when compared
22 to those obtained in Examples I and IV.
- 23 (iii) The humidity resistance of the CB sheets is
24 relatively higher.
- 25 (iv) The humidity resistance under weight, or in
26 other words the smudge resistance of the microcapsule
27 coatings, is far better than that as obtained
28 in Examples I and IV.
- 29 (v) The coated papers are not affected when stored
30 at lower temperatures like 5°C.
- 31 (vi) Up to seven clear copies on 50 g/m² base paper
32 are obtained.

33 Preparation of Color Developer:

34 Example A

35 60 parts precipitated silica and 40 parts kaolin are
36 dispersed in 180 parts water under stirring. To the



1 dispersion, 100 parts 25% p-phenyl phenol formaldehyde
2 resin, 100 parts 20% oxidized starch solution
3 water, and 20 parts 50% SBR latex are added and mixed
4 thoroughly in a ball mill.

5 Example B

6 60 parts precipitated silica and 40 parts kaolin
7 are dispersed in 180 parts water containing 5 parts
8 pectin under stirring. To the dispersion, 100 parts of
9 25% p-phenyl phenol formaldehyde resin, 100 parts
10 20% oxidized starch solution in water, and 20 parts
11 50% SBR latex are added and mixed thoroughly in a
12 ball mill.

13 Example C

14 Example B is repeated by using 5 parts sulfated starch
15 instead of 5 parts pectin.

16 The final compositions from each of these
17 examples are coated at 5 g/m^2 onto a 50 g/m^2 base
18 paper.

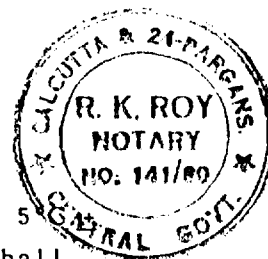
19 These coated papers (Examples A, B and C),
20 i.e. the CF sheets, are tested by using the following
21 procedures and the results are presented in the
22 comparative analytical table (Table II).

23 Testing Procedures:

24 (i) Humidity resistance

25 This is considered to be a measure of the
26 life of the CF paper in an acceptable active
27 condition.

28 Coated papers are kept in a humidifier at 50°C
29 $\pm 0.5^\circ\text{C}$ and 98% RH for 4 hours.



- 1 (ii) Image formation
- 2 CB and CF papers are conditioned at 5
- 3 0.5°C and tested by writing with a ball
- 4 point pen. Similar testing is done at 30°C
- 5 also.
- 6 (iii) Image stability
- 7 (a) Water resistance Copies on CF sheets are
- 8 washed under a stream of
- 9 tap water.
- 10 (b) Solvent resistance Copies on CF sheets are
- 11 rubbed by cotton soaked
- 12 with benzene, toluene,
- 13 and acetone.
- 14 (c) Ultraviolet
- 15 resistance Copies on CF sheets are
- 16 kept under an ultraviolet
- 17 light source situated
- 18 100mm away from the image.
- 19 (d) Sunlight resistance Copies on CF sheets are
- 20 exposed to sunlight for 1
- hour.

TABLE II
Comparative Analytical Table (CF)

		<u>Example</u>		
		<u>A</u>	<u>B</u>	<u>C</u>
23				
24				
25	Moisture resistance of CF paper	d*	b	b
26	Image formation at 30°C	b	a	a
27	Image formation at 5°C	d	a	a
28	Image Stability:			
29	Water resistance	a	a	a
30	Solvent resistance	d	c	c
31	Ultraviolet resistance	c	c	c
32	Sunlight resistance	d	c	c

* Ratings:

a = very good

b = good

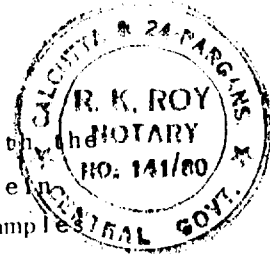
c = satisfactory

d = relatively unsatisfactory

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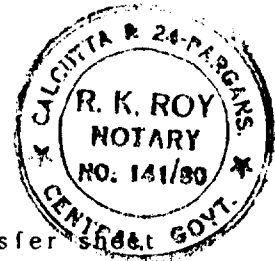
1 The following observations are found with
2 CF coated papers and the images developed thereon
3 according to the process of the invention (Example
4 B and C):

- 5 (i) Image formation is relatively quick at 30°C
6 as well as at 5°C and much faster than that
7 as obtained in Example A.
8 (ii) The coated papers have a relatively good
9 moisture resistance.
10 (iii) The image stability is good which is demonstrated
11 by the fact that the image has good resistance
12 to water, solvents, ultraviolet light, and
13 sunlight.

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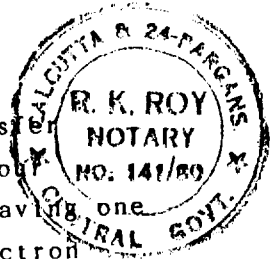
- 1 What is claimed is:
- 2 1. A pressure-sensitive color transfer sheet
3 containing an electron donating chromogenic color
4 former for use in combination with a second sheet
5 containing an electron accepting color developer,
6 said color former being dispersed in a hydrophilic
7 colloid solution to form substantially cluster-free
8 microcapsules, the said colloid solution containing
9 a water soluble graft copolymer having a backbone of
10 carboxymethyl cellulose or gum arabic and side chains
11 of polyacrylic acid or polymethacrylic acid, said
12 side chains comprising from 5 to 10 per cent by weight
13 of said copolymer.
- 14 2. A pressure-sensitive color transfer sheet
15 according to claim 1 wherein the hydrophilic colloid
16 solution comprises gelatin and the graft copolymer.
- 17 3. A pressure-sensitive color transfer sheet
18 according to claim 2 wherein the amount of graft
19 copolymer is within the range of 1/8 to 1/4 by weight
20 of the amount of gelatin.
- 21 4. A carbonless copy paper color transfer system
22 comprising a pressure-sensitive color transfer
23 sheet having one side coated with a layer containing
24 an electron donating chromogenic color former,
25 said layer being in contact with a second layer
26 coated on a second sheet, said second layer containing
27 an electron accepting color developer, said color
28 former being dispersed in a hydrophilic colloid
29 solution to form substantially cluster-free microcapsules,
30 the said colloid solution containing a water soluble
31 graft copolymer having a backbone of carboxymethyl
32 cellulose or gum arabic and side chains of polyacrylic
33 acid or polymethacrylic acid, said side chains
34 comprising from 5 to 10 per cent by weight of said
35 copolymer.

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1 5. A carbonless copy paper colour transfer
2 system comprising a pressure sensitive color
3 transfer sheet referred to as top sheet, having one
4 side coated with a layer containing an electron
5 donating chromogenic colour former, a plurality
6 of further set of sheets, a second layer coated
7 on upper face of each sheet of said further set
8 of sheets, said second layer on each such upper
9 face containing an electron accepting colour
10 developer, said color former being dispersed in a
11 hydrophilic colloid solution to form substantially
12 cluster-free micro-capsules, the said colloid solution
13 containing a water soluble graft copolymer having a
14 backbone of carboxymethyl cellulose or gum arabic
15 and side chains of polyacrylic acid or polymethacrylic
16 acid, said side chains comprising from 5 to 10 per cent
17 by weight of said copolymer, bottom face of each sheet
18 with the exception, if desired, of bottom most sheet,
19 in said further set of sheets, being coated as the
20 bottom face of the top sheet, said second layer being
21 in contact with the said first layer coated on one
22 face of the sheet above it.

23 6. A carbonless copy paper according to claim 4
24 or 5 wherein the hydrophilic colloid solution comprises
25 gelatin and the graft copolymer.

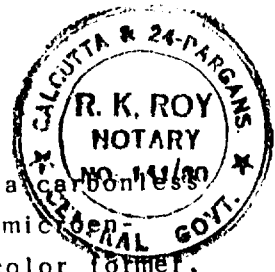
26 7. A carbonless copy paper according to claim 6
27 wherein the amount of graft copolymer is within the
28 range of 1/8 to 1/4 by weight of the amount of gelatin.

29 8. A carbonless copy paper according to claim 4
30 or 5 wherein the color developer contains pectin
31 or sulfated starch.

32 9. A carbonless copy paper according to claim 4
33 or 5 wherein the color developer is p-phenyl
34 formaldehyde resin.

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- 1 10. A color developer sheet for use in a carbonless
2 copy paper color transfer system having a micro-
3 capsulated electron donating chromogenic color former,
4 said sheet containing pectin or sulfated starch
5 to improve the image response time.
- 6 11. A color developer sheet according to claim 10
7 containing p-phenyl phenol formaldehyde resin and
8 pectin or sulfated starch.
- 9 12. Process of preparing colour former microcapsules
10 for use in carbonless copy paper comprising dissolving
11 acid treated gelatin in warm water, emulsifying
12 alkyl naphthalene containing crystal violet lactone
13 in said gelatin solution, adding dilute aqueous
14 solution of one or more of a thickening agent such
15 as GNC, GA, graft copolymers of GNC and GA containing
16 PAA, PMA to said emulsion under mild stirring and
17 adding to it large quantities of warm water, stirring,
18 adjusting the pH thereof to 5.0 - 5.5 with aqueous
19 alkali, adding 50 parts of formaldehyde to it, adjusting
20 the pH to 10 with dilute aqueous alkali, to the
21 dispersion so obtained adding cellulose powder,
22 starch and partially hydrolysed polyvinyl alcohol.
- 26 14. Process for preparing color developer for
27 use in carbonless copy paper comprising dispersing
28 silica and kaolin in water under stirring, adding
29 to the dispersion so obtained p-phenyl phenol
30 formaldehyde, oxidised starch solution in water
31 and SBR latex and mixing thoroughly, e.g. in a ball
32 mill.

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-17-

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1 15. Process as claimed in claim 14 in which water
2 in which silica and kaolin are dispersed, contains
3 pectin or sulfated starch.