

[54] **BASIC MORDANTS CONTAINING
N-(3-DIALKYLAMINO-2-
HYDROXYPROPYL) SUCCINIMIDE**

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[52] U.S. Cl. **96/84 A; 96/57; 117/161 P**

[51] Int. Cl. **G03c 1/84**

[58] Field of Search **96/84 A, 57; 117/161 P,
117/33.3**

[56] **References Cited**

UNITED STATES PATENTS

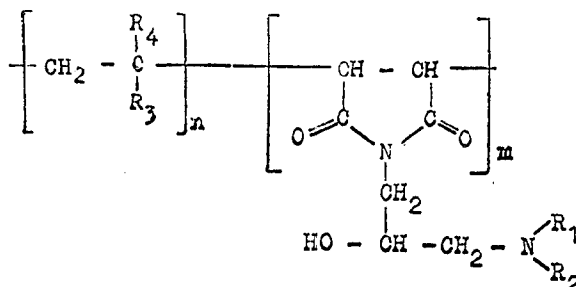
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Primary Examiner—J. Travis Brown

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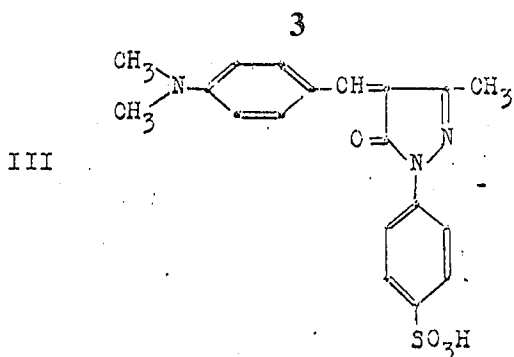
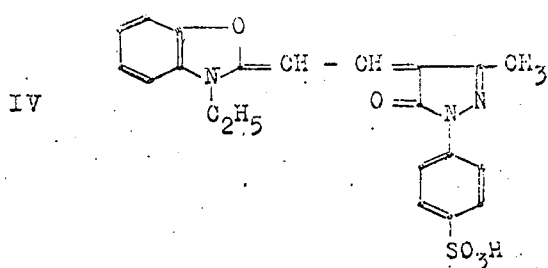
[57] **ABSTRACT**

Polymeric basic mordants, particularly useful for acid-substituted dyes in photographic elements, of the formula



wherein m and n are integral numbers from 20 to 100 and $m/(m+n)=0.3$ to 0.5 , R_1 is a hydrogen atom or an alkyl group of up to 8 C atoms and R_2 is an alkyl of up to 8 C atoms or an aryl group of 6 C atoms or R_1 and R_2 together with the N atom to which they are bonded constitute a N-containing heterocyclic ring having up to 5 C atoms in the ring, R_3 is a hydrogen atom, an aryl of 6 C atoms or carboxyl group, and R_4 is a hydrogen atom or an alkyl group of up to 4 C atoms.

5 Claims, No Drawings



But dyes such as Green PL (see Dr. Gustav Schultz, *Dye Tables*, Berlin 1923, Weidmann'sche Buchhandlung, No. 4, p. 4) as well as bisazo dyes (as described in D.D.R. Patent No. 54,882) can also be mordanted diffusion resistant with good results with the mordants according to the invention.

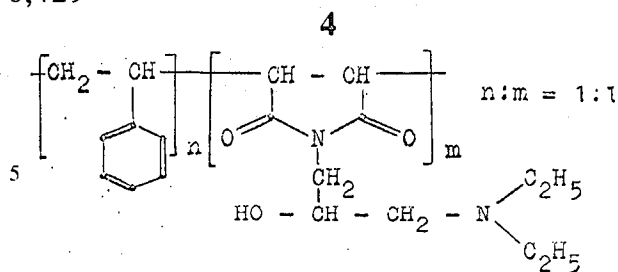
The following examples will demonstrate the use of the mordants on the basis of their effect on dyes. But acid-substituted compounds which are not dyes can also be mordanted diffusion-resistant, such as the anthraquinone desensitizers disclosed in D.D.R. Pat. No. 11,035.

The dyes and mordants can be added to a silver halide emulsion layer or to a special auxiliary layer of silver halide-free gelatin. If dye developers are used together with the mordants, this may have a negative effect on the mordanting action; it is therefore necessary to make a suitable selection of developer, for example, by using so-called protected developers.

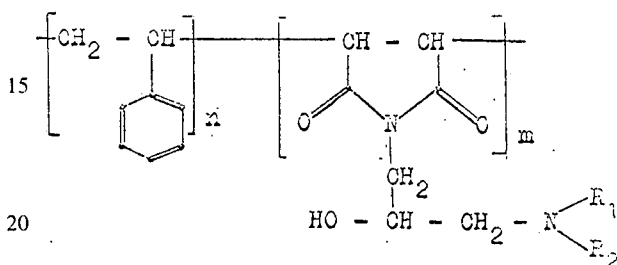
EXAMPLE 1

A. Production of the copolymer of styrene and maleic-N-(3-diethylamino-2-oxypropyl)-imide.

3-diethylamino-2-hydroxypropylamine is obtained by reacting concentrated NH_3 solution with 3-diethylamino-1,2-epoxy-propane, the latter being obtained by reaction of epichlorohydrin with dimethylamine, in a very good yield. To a solution of 19 g. (0.13 mole) of the 3-diethylamino-2-oxypropylamine in 200 ml. dimethyl formamide is added dropwise with stirring and heating in a steam bath 18.7 g. of a styrene-maleic anhydride (1:1 mole ratio) copolymer in 200 ml. dimethyl formamide, and subsequently 100 ml. dimethyl formamide is distilled off. The mixture is cooled to room temperature and introduced slowly with vigorous stirring into a 12% aqueous NaCl solution. The resultant precipitated product is washed thoroughly with water and pulverized. It dissolves immediately in dilute acetic acid. Yield 20 g. Formula:



10 B. In a similar manner, basic polymers of the following structures were produced:



a. $R_1 + R_2 = (-\text{CH}_2)_5-$

b. $R_1 + R_2 = -\text{CH}_2\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_2-$ by reacting

25 a. 3-piperidino-2-hydroxypropylamine

b. 3-morpholino-2-hydroxypropylamine with the aforementioned 1:1 copolymer of styrene and maleic anhydride.

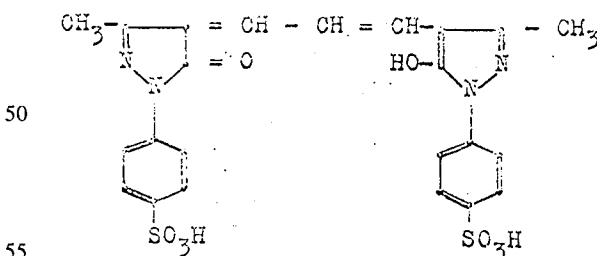
The compounds dissolved in undiluted acetic acid.

30 C. Production of quaternized derivatives of compounds of Example 1(A) by reaction with alkylating agents.

8.2 g. of the product of Example 1(A) is dissolved in 100 ml. acetone and mixed with 4.5 g. dimethyl sulfate. The solution is heated to a boil for 90 minutes with refluxing and the quaternary salt formed precipitates. After cooling, the product is drained and washed thoroughly with acetone. Yield 12 g. The product dissolves easily in water.

EXAMPLE 2

Respective 100 ml. quantities of a 6% gelatin solution are stained with 100 mg. of an exonol dye of the formula



and mixed with or not mixed with a solution of 200 mg. of the mordant of Example 1(A) in 1% acetic acid, as well as being mixed with 1 ml. of a 4% wetting agent solution. The colored gelatins obtained are poured on a cellulose acetate base and dried. In order to test the diffusion, colorless gelatin layers, pre-swollen in water, are rolled on the dried test pieces and left there for a short time (10 minutes). After separating the two layers and drying, the stained receiving layers are now measured by means of a spectrophotometer. The layer of each of the two test pieces has also been measured

wherein m and n are integral numbers from 20 to 10 and $m/(m+n)=0.3$ to 0.5 , R_1 is a hydrogen atom or an alkyl group of up to 8 C atoms and R_2 is an alkyl of up to 8 C atoms or an aryl group of 6 C atoms or R_1 and R_2 together with the N atom to which they are bonded constitute a piperidino or morpholino ring having up to 5 C atoms in the group, R_3 is a hydrogen atom, an aryl of 6 C atoms or carboxyl group and R_4 is a hydrogen atom or an alkyl group of up to 4 C atoms.

2. A photographic element according to claim 1, in which the acid-substituted compound is a dye.

3. A photographic element according to claim 2, in which the dye is of the oxonol, azo or dialkylaminobenzylidene type.

4. A photographic element according to claim 2, in which the layer containing the mordanted dye comprises a silver halide emulsion.

5. A photographic element according to claim 2, in which the layer containing the mordanted dye is silver halide-free.

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