

UNITED STATES PATENT OFFICE

2,306,923

ART OF PHOTOGRAPHY

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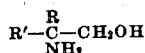
12 Claims. (Cl. 95—88)

This invention, relating to photography, has more particular reference to developing, and especially of fine grain character. The attaining of fine grain development by the use of certain amino-hydroxy compounds without occurrence of undesirable "developing fog" has been a matter of particular difficulty in the art, and so far as I am aware has not been generally obtainable except in the manner set forth in my co-pending application Serial No. 274,225 (Patent No. 2,197,017). The ethanolamine type of compounds which have been known for some time in connection with fine grain work have been under the particular disadvantage of an exaggerated tendency to production of developing fog, which has militated against their usage, notwithstanding their advantage of cheapness and wide availability. I have now found that with a type of compound which, instead of having hydroxy and amino groups as in the ethanolamine type of compounds, is molecularly arranged as hereinafter indicated, surprisingly different results and absence of fogging tendency characteristic of the ethanolamine type of compounds, is attained. Operation and compositions in accordance with the invention furthermore are relatively simple also, and of reasonable cost.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In preparing developing compositions in accordance with the invention, the amino-hydroxy compounds of the character above mentioned are incorporated with a silver halide developing agent in the developing composition. These amino-hydroxy compounds are of open chain type, in contrast to aromatic compounds, and are alkyl substituted amino-hydroxy aliphatic compounds and may be conveniently obtained as reduction derivatives of aldehyde condensation products of nitroparaffins, the methods therefor and the products being known in pure chemical industry. These reduction products of aldehyde condensation with nitroparaffins form a range of products which more particularly extend from amino-propanols to amino-octanols and beyond, and there may be not only one hydroxyl, but two or three, as desired. That is, amino triols, diols, or monols are useful. The

water soluble members of this group, or those having sufficient solubility to go into concentrations available for developing work, I have found to be outstandingly advantageous in developing compositions. Illustrative members of the group noted are trimethylolamino-methane, 2-ethyl-2-amino-1,3-propanediol, 2-propyl-2-amino-1,3-propanediol, 2-isopropyl-2-amino-1,3-propanediol, 2-methyl-2-amino-1,3-propanediol, 2-methyl-2-amino-1-propanol, etc. That is, the compounds are of the general type



15 in which R is an alkyl radical and R' is an alkyl which optionally may have a hydroxyl. The amino hydroxy compound may be employed in proportions varying in accordance with the conditions and results in view, but in general concentrations of 0.1 to 1.0 per cent are satisfactory. The advantageous properties of the compounds in developing are realized with any of the silver halide developing agents, but especially excellent results are had with combinations involving developers of the fine grain type; and compositions including a sulphite of morpholine which is set forth in my co-pending patent application Serial No. 270,922, are particularly desirable.

To especial advantage also, the sulphites of the amino-hydroxy compounds referred to may be formed, and these may be used in developing compositions without inclusion of a sulphite of morpholine, if desired. For the production of the sulphites of the amino-hydroxy compounds methods are known in pure chemistry, or they may be prepared for instance by passing sulphur dioxide into a predetermined amount of the amino-hydroxy compound until an amount of the sulphur dioxide equivalent in terms of mols of sulphur dioxide for combination to the desired sulphite, is absorbed. Gaseous or liquid sulphur dioxide may be used, and in the absence of water, and the reaction proceeds rapidly, being accompanied by evolution of heat, and the temperature must be controlled against excessive rise.

As an illustrative developing composition, the following may be noted:

Trimethylolaminomethane	grams	1
Paraphenylenediamine	do	16
Glycine	do	6
Sodium sulphite	do	80
Potassium bromide	do	0.5
Water	liters	1.2

55 Similarly, others of the amino-hydroxy com-

pounds described may be employed. The developing is carried out at customary developing temperatures, usually 70-75° C., although there is no critical limitation on temperature by reason of the amino-hydroxy compound.

As another example:

Trimethylaminomethane sulphite	grams	10
Paraphenylenediamine	do	16
Glycine	do	6
Sodium sulphite	do	80
Potassium bromide	do	0.5
Water	liters	1.2

Similarly, the sulphites of the other amino-hydroxy compounds may be employed.

As another example:

Trimethylaminomethane	grams	10
Paraphenylenediamine	do	16
Glycine	do	6
Morpholine bisulphite	do	15
Sodium sulphite	do	80
Potassium bromide	do	0.5
Water	liters	1.2

In like manner also, others of the amino-hydroxy compounds concerned may be employed.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A photographic developer, comprising trimethylaminomethane sulphite, glycine, paraphenylenediamine, sodium sulphite, and potassium bromide.

2. A photographic developer, comprising 2-ethyl-2-amino-1,3-propanediol sulphite, glycine, paraphenylenediamine, sodium sulphite, and potassium bromide.

3. A photographic developer, comprising 2-methyl-2-amino-1-propanol sulphite, glycine, paraphenylenediamine, sodium sulphite, and potassium bromide.

4. A photographic developer, comprising tri-

methylaminomethane sulphite, and a silver halide developing agent.

5. A photographic developer, comprising 2-ethyl-2-amino-1,3-propanediol sulphite, and a silver halide developing agent.

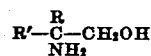
6. A photographic developer, comprising 2-methyl-2-amino-1-propanol sulphite, and a silver halide developing agent.

7. A photographic developer, comprising trimethylaminomethane, a sulphite of morpholine, and a silver halide developing agent.

8. A photographic developer, comprising 2-ethyl-2-amino-1,3-propanediol, a sulphite of morpholine, and a silver halide developing agent.

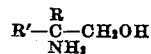
9. A photographic developer, comprising 2-methyl-2-amino-1-propanol, a sulphite of morpholine, and a silver halide developing agent.

10. A photographic developer, comprising a sulphite of an aliphatic amino compound of the general formula



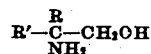
in which R is an alkyl radical and R' is an alkyl which optionally may have a hydroxyl sufficiently soluble for working concentration, and a silver halide developing agent.

11. A photographic developer, comprising an aliphatic amino compound of the general formula



in which R is an alkyl radical and R' is an alkyl which optionally may have a hydroxyl sufficiently soluble for working concentration, a sulphite of morpholine, and a silver halide developing agent.

12. A photographic developer, comprising an aliphatic amino compound of the general formula



in which R is an alkyl radical and R' is an alkyl which optionally may have a hydroxyl sufficiently soluble for working concentration, and a silver halide developing agent.

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