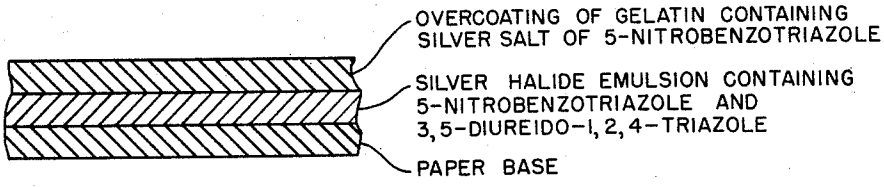
Dec. 1, 1959 S. P. POPECK ET AL 2,915,395

ANTIFOGGING AGENTS FOR LIGHT SENSITIVE PAPER EMULSIONS

Filed Feb. 15, 1957



STANLEY P. POPECK
JOSEPH R. SOTTYSIAK
INVENTORS

BY Henry W Coyle
Edward P Gilheany

ATTORNEYS

United States Patent Office 2,915,395 Patented Dec. 1, 1959

2,915,395

ANTIFOGGING AGENTS FOR LIGHT SENSITIVE PAPER EMULSIONS

Stanley P. Popeck and Joseph R. Sottysiak, Binghamton, N.Y., assignors to General Aniline & Film Corporation, New York, N.Y., a corporation of Delaware

Application February 15, 1957, Serial No. 640,428

5 Claims. (Cl. 96—85)

The present invention relates to photographic paper emulsions and more particularly to such emulsions containing 5-nitrobenzotriazole as a stabilizer therefor.

It is customary practice to incorporate in photographic paper emulsions, such as those from silver chloride, silver bromide, silver chlorbromide and the like, a stabilizer having the ability to act as an antifogging agent for the emulsion. One type of such agent recommended for this purpose is a heterocyclic mercapto compound. It has been ascertained, however, that this type of compound, while it is capable of operating as an antifogging agent, has the unfortunate characteristic of causing the image produced in the paper to fade on aging and to assume a yellow tone. There is, therefore, a decided need for stabilizers which not only are antifoggants for paper emulsions but, at the same time reduce the tendency of the image produced in the emulsion to fade or change color on aging.

We have discovered that an agent meeting these characteristics is 5-nitrobenzotriazole which may be incorporated in the emulsion as a coating final. We have also discovered that a further improvement in fog resistance is obtained when overcoating a paper emulsion containing the 5-nitrobenzotriazole with a gelatin surface layer containing the silver salt of said 5-nitrobenzotriazole.

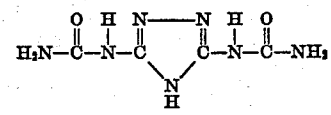
It is recognized that antifogging agents normally tend to restrict the rate of development of the emulsion in which they are located. This is equally true of the 5-nitrobenzotriazole which we find so satisfactory as an antifogging agent.

A further and important discovery, the use of which is contemplated herein, involves the employment in the emulsion with the 5-nitrobenzotriazole, of 3,5-diureido-1,2,4-triazole to overcome the slow development rate imparted to the emulsion by the 5-nitrobenzotriazole. Said diureido compound may be used as such or in the form of its disulfonate.

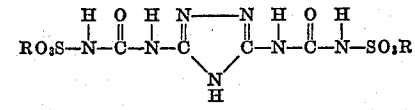
Photographic paper emulsions containing 5-nitrobenzotriazole as an antifogging agent, such emulsions overcoated with a gelatin surface layer containing the silver salt of 5-nitrobenzotriazole, and such emulsions containing the aforementioned diureido-triazoles as development accelerators, constitute the purposes and objects of our invention.

The 5-nitrobenzotriazole is generally employed in the emulsion in a quantity of 100 to 500 mgs. per 100 gms. of silver nitrate. This compound is added to the emulsion just prior to coating in a solution of methanol or ethanol or of water and an organic solvent miscible with water such as Cellosolve. Typically, we have employed alcoholic solutions of the stabilizer. The emulsion, following the addition of the 5-nitrobenzotriazole, is coated and dried.

To improve the rate of development of the emulsions so coated, it is recommended that there also be added to the emulsion, either 3,5-diureido-1,2,4-triazole or a water soluble disulfonate thereof. These compounds have the following structural formulae:



and



wherein R is an alkali metal such as sodium, potassium or the like.

The aforesaid diureido compounds are added at the same time as the 5-nitrobenzotriazole and in a concentration of about 100 to 500 mgs. per 100 gms. of silver nitrate. Said compounds operate to improve the development rate over and above the acceptable rate with the 5-nitrobenzotriazole alone.

The 5-nitrobenzotriazole in and of itself is an excellent antifogging agent. Nevertheless, a further improvement in fog resistance is realized if an emulsion containing said agent is overcoated with a gelatin surface layer containing the silver salt of 5-nitrobenzotriazole in a concentration ranging from 20 to 50 mgs. per kilogram of gelatin.

The invention is further illustrated by the accompanying, self-explanatory drawing and examples in which the parts are by weight.

Example I

A chlor-bromide paper emulsion is prepared in the usual way and just prior to coating, there are added thereto 250 mgs. per 100 gms. of silver nitrate of 5-nitrobenzotriazole in alcohol. The emulsion is coated on a paper base and dried.

The dried emulsion is then overcoated with a gelatin surface layer containing an alcoholic solution of the silver salt of 5-nitrobenzotriazole in a concentration of 30 mgs. per kilogram of gelatin.

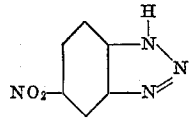
The resulting light sensitive paper emulsion will be found to be fog free and to yield, upon exposure and development, a silver image which will not yellow or fade on aging.

Example II

The procedure is the same as in Example I excepting that 3,5-diureido-1,2,4-triazole is added to the emulsion with the 5-nitrobenzotriazole, the diureido compound being added in a concentration of 300 mgs. per 100 gms. of silver nitrate.

An emulsion is thus obtained which not only has the characteristics of those of Example I but, in addition, has a development rate over and above the acceptable rate with 5-nitrobenzotriazole alone.

5-nitrobenzotriazole which has the following constitution



and 3,5-diureido-1,2,4-triazole are known compounds.

The dialkali metal sulfonates of the latter compound may be obtained by reacting the free 3,5-diureido-1,2,4-triazole with chlor-sulfonic acid in the presence of an acid binding agent such as pyridine, trimethylamine and the like.

Modifications of the invention will occur to persons skilled in the art and we, therefore, do not intend to be limited in the patent granted except as necessitated by the appended claims.

We claim:

1. A light sensitive photographic paper comprising a base coated with a silver halide emulsion containing 5-nitrobenzotriazole as an antifogging agent and a compound selected from the class consisting of 3,5-diureido-1,2,4-triazole and its dialkali metal sulfonate as a development accelerator.

2. The article as defined in claim 1 wherein the antifogging agent and the development accelerator are present in a concentration of from 100 to 500 mgs. per 100 gms. of silver nitrate.

3. The article as defined in claim 1 wherein the silver halide emulsion is overcoated with a gelatin surface layer containing the silver salt of 5-nitrobenzotriazole.

4. The article as defined in claim 3 wherein the silver salt of the 5-nitrobenzotriazole is present in a concentration ranging from 20 to 50 mgs. per kilogram of gelatin.

5. The article as defined in claim 1 wherein the silver halide emulsion is a gelatino silver chlor-bromide emulsion.

References Cited in the file of this patent

UNITED STATES PATENTS

2,656,271 Neugebauer et al. ---------- Oct. 20, 1953

FOREIGN PATENTS

142,505 Australia ---------- Mar. 17, 1949

OTHER REFERENCES

Beilstein: "Handbuch de Organischen Chemie," pages 43–44, volume 26, Edwards Brothers Inc., Lithoprinters, Ann Arbor, Mich., 1944. (Copy in Sci. Libr.)