

## UNITED STATES PATENT OFFICE

2,384,897

PRODUCTION OF PHOTOGRAPHS IN  
BLUE TONESFritz Dersch and Newton Heimbach, Binghamton,  
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poration, New York, N. Y., a corporation of  
DelawareNo Drawing. Application June 25, 1942,  
Serial No. 448,416

6 Claims. (Cl. 95-6)

This invention relates to a method for produc-  
ing developed silver bromide pictures from silver  
bromide emulsions, and more particularly to a  
method by which said developed pictures are pro-  
duced with a blue-black tone.

Many organic compounds have been suggested  
from time to time for producing a blue toning ef-  
fect on silver chloride emulsions. Thus triazole,  
quinine and similar compounds have been em-  
ployed for this purpose. Such compounds, how-  
ever, have little or no effect on the tone of a  
silver bromide emulsion. Very few agents are  
mentioned in the literature as blue toners for  
bromide emulsions. A condensation product of  
cystine and formaldehyde has been suggested for  
this purpose, but this particular compound is  
known to cause serious fogging.

With this prior art in view, it is accordingly one  
object of the present invention to provide a new  
process for the production of blue-black tones in  
silver bromide emulsions.

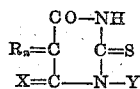
A further object is to provide a new class of  
blue toning agents for silver bromide emulsions  
which will not have a serious fogging effect.

Another object is to provide a new class of blue  
toning agents which may be incorporated directly  
into a light sensitive silver bromide emulsion.

An additional object is to provide such agents  
which may be added to a photographic developer.

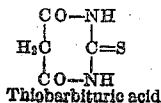
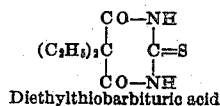
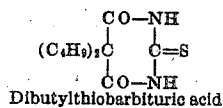
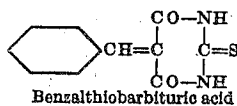
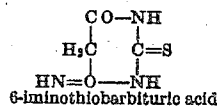
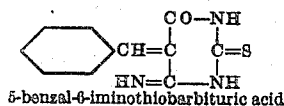
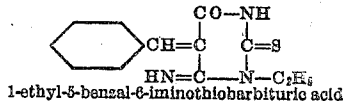
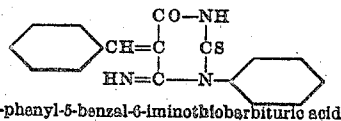
Other objects and advantages of the present  
invention will be readily apparent from the fol-  
lowing description.

We have found that the foregoing objects are  
accomplished by the use of a new class of com-  
pounds as blue toning agents for silver bromide  
emulsions. This class of compounds has the fol-  
lowing formula:



wherein R stands for hydrogen, alkyl or aryl; X  
stands for O or NH; and Y stands for hydrogen,  
alkyl, or aryl;  $n$  equals 1 in the case of aryl and 2  
in the case of hydrogen and alkyl.

Typical compounds corresponding to the above  
formula which are included in this invention are  
as follows:



In order that those persons skilled in the art  
may fully understand the purpose and scope of  
this invention, the following detailed examples  
are given:

## Example I

A metol-hydroquinone developer of the follow-  
ing composition is prepared:

|                   |       |     |
|-------------------|-------|-----|
| Metol             | grams | 4.5 |
| Sodium sulphite   | do    | 54  |
| Hydroquinone      | do    | 7.5 |
| Sodium carbonate  | do    | 40  |
| Potassium bromide | do    | 2   |
| Water to make cc. | 1750  |     |

To this developer solution there are added 125  
mg. of diethylthiobarbituric acid. Upon develop-  
ing a normally warm-toned exposed gelatino sil-  
ver bromide emulsion film in this developer, blue  
tones will be produced in the silver image.

## Example II

A metol-hydroquinone developer of the same

composition as Example I is prepared. To this developer there are added 125 mg. of dibutylthiobarbituric acid. Upon developing a normally warm-toned exposed gelatino silver bromide emulsion film in this developer a blue toned silver image is obtained.

### Example III

A metol-hydroquinone developer having the same composition as Example I is prepared. To this developer are added 125 mg. of 5-benzal-6-iminothiobarbituric acid. Upon developing an exposed gelatino silver bromide emulsion which is normally warm-toned in this developer the developed silver image will show a noticeable blue tone.

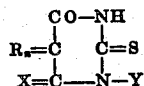
### Example IV

To 1 kilogram of a gelatino silver bromide emulsion there is added, prior to the coating, 75 mg. of 5-benzal-6-iminothiobarbituric acid. Exposure and development of this emulsion in an ordinary developer such as the metol-hydroquinone developer of Example I will yield a silver image having a blue tone. Any of the above mentioned thiobarbituric acid compounds may be substituted for the 5-benzal-6-iminothiobarbituric acid of this example.

It will be apparent that the amounts of the foregoing agents may vary slightly with the different types of silver bromide emulsions, whether the toning agent is used in the emulsion or in the developing composition. However, the optimum quantities required for a particular composition can readily be determined by a few simple tests. The examples are accordingly to be interpreted as illustrative rather than as limitations of the invention. It will be understood that these blue toning agents are equally useful in connection with mixed emulsions which contain one or more additional silver halides, provided said emulsions contain a substantial amount of silver bromide. Thus, for example, these blue toners may be used with gelatino silver chloro-bromide emulsions with the same good results as are obtained with the silver bromide emulsions defined in the specific examples.

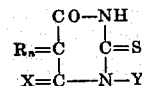
Having now fully set forth and described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a process for producing developed silver pictures in blue tones from silver bromide emulsions, the improvement which comprises developing said emulsions in the presence of a quantity of an organic compound corresponding to the formula



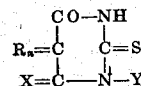
wherein R stands for a member of the group consisting of hydrogen, alkyl and aral; X stands for a member of the group consisting of O and NH; Y stands for a member of the group consisting of hydrogen, alkyl and aryl,  $n$  being 1 in the case of aral and 2 in the case of hydrogen and alkyl, sufficient to produce blue toning of the developed image.

2. A photographic material comprising a silver bromide emulsion layer containing a quantity of an organic compound corresponding to the formula



wherein R stands for a member of the group consisting of hydrogen, alkyl and aral; X stands for a member of the group consisting of O and NH; and Y stands for a member of the group consisting of hydrogen, alkyl and aryl,  $n$  being 1 in the case of aral and 2 in the case of hydrogen and alkyl, sufficient to produce blue toning in the development of the emulsion.

3. A photographic developer for development of silver bromide emulsions comprising developing agents and a quantity of an organic compound corresponding to the formula



wherein R stands for a member of the group consisting of hydrogen, alkyl and aral; X stands for a member of the group consisting of O and NH; and Y stands for a member of the group consisting of hydrogen, alkyl and aryl,  $n$  being 1 in the case of aral and 2 in the case of hydrogen and alkyl, sufficient to produce blue toning of silver bromide emulsions developed therein.

4. A photographic developer for development of silver bromide emulsions comprising developing agents and as a blue toning agent diethylthiobarbituric acid.

5. A photographic developer for development of silver bromide emulsions comprising developing agents and as a blue toning agent dibutylthiobarbituric acid.

6. A photographic developer for development of silver bromide emulsions comprising developing agents and as a blue toning agent 5-benzal-6-iminothiobarbituric acid.

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