

[54] **ETCH-BLEACHING TREATMENT OF EXPOSED AND DEVELOPED PHOTO PLATES AND FILMS**

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[58] **Field of Search**..... 96/36, 36.2; 156/5; 134/1

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[57]

ABSTRACT

This invention provides a method for the etch-bleaching treatment of exposed and developed photo plates, films and the like. The method comprises the immersing of the developed photo article in an etch-bleaching solution and applying an ultrasonic sound to the immersed article from an ultrasonic source, whereby the gelatin particles of the photo article are completely removed therefrom.

6 Claims, No Drawings

ETCH-BLEACHING TREATMENT OF EXPOSED AND DEVELOPED PHOTO PLATES AND FILMS

BACKGROUND OF THE INVENTION

This invention relates to a method for the etch-bleaching treatment of exposed and developed photo plates, films and the like.

There are several known processes of etch-bleaching photo plates, films and the like. Generally, the etch-bleaching treatment provides for the bleaching of the silver images on the photo plates and films, and for the selective decomposition of the binding agents in the exposed areas of the photo plates and films. However, it is common in the known etch-bleaching processes that the gelatin particles which are supposed to be removed during the process, are not removed completely. Because of this, other means such as mechanical means are required to completely remove the gelatin particles from the treated photo plate or film. Usually, the partially dissolved and unremoved gelatin particles are wiped away with a soft cloth. This procedure, although removing the gelatin particles provides undesired and different results than those required. That is, the removal of the gelatin may be uneven and not completely clean.

In one process of etch-bleaching photo plates and films, there is provided an etch-bleaching solution which is supposed to remove even the hardened gelatin from photo plates and films in a short period of time. In this etch-bleaching solution, there is provided 1.1 mol of copper cupric cations per liter of solution and anions which form an insoluble silver salt. However, even with this etch-bleaching solution, the gelatin particles are not removed completely from the photo plates without applying additional mechanical means, e.g. wiping the gelatin particles off with a soft cloth.

SUMMARY OF THE INVENTION

In view of the disadvantages of the prior art and in accordance with the principles of the present invention an improved method is provided for the etch-bleaching treatment of exposed and developed photo plates and films. The method provides a means for completely removing the gelatin particles from photo plates and/or films during the etch-bleaching thereof. The method comprises immersing the photo article in an etch-bleaching solution containing copper cations, and applying an ultrasonic sound to the immersed photo article from an ultrasonic source for a sufficient period of time to completely remove the gelatin particles therefrom.

Therefore, it is an object of the present invention to provide an improved method for etch-bleaching photo plates, films and the like.

A more particular object of the present invention is to provide a method of etch-bleaching photo plates and/or films wherein the gelatin particles are completely removed from the treated photo article.

Other objects, features and advantages of the invention will be readily apparent from the following description of the preferred embodiments thereof, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is concerned with the etch-bleaching treatment of photo plates, films and the like. In the etch-bleaching treatment of exposed and developed photo plates and films, the silver images of the photo article are bleached and the binding agents remaining in the exposed areas of the photo article are selectively decomposed. Also, the partially decomposed gelatin particles of the treated photo article need to be removed and cleaned therefrom in order to provide a satisfactory and functionary photo plate or film.

The present method is primarily concerned with a means and method of removing completely the gelatin particles from photo plates and/or films during the etch-bleaching treatment thereof.

According to the present invention a photo plate or film is etch bleached by first being immersed into an etch-bleaching solution and then applying an ultrasonic sound to the immersed photo article for a sufficient period of time to completely remove the partially dissolved gelatin particles from the treated photo article. Generally, in the present process, the photo article being treated, i.e. etch-bleached, such as a photo plate or film is initially suspended vertically within a suitable etch-bleaching solution. Then, an ultrasonic sound source which may be movably mounted in the etch-bleaching bath, is moved back and forth in a reciprocating manner in a path which is parallel to the surface of the photo article being treated. By this procedure, it has been found that the gelatin particles of a photo plate or film are completely removed therefrom during the etch-bleaching treatment.

The etch-bleaching solution that can be used according to the present invention, includes a mixture of copper chloride, a mild acid, water and hydrogen peroxide. The mild acid may be glacial acetic acid or citric acid. The copper chloride may be a cupric copper solution. The copper chloride may also be replaced with copper sulfate and/or sodium bromide.

The source for the ultrasonic or high frequency sound may be any conventional apparatus or device known in the art. According to the present invention, it is preferred that the ultrasonic source is not firmly placed or mounted in front of the photo article. The ultrasonic source is preferably arranged in the etch-bleaching path to move in a path which is parallel to the surface of the photo plate or film being treated.

The following examples will further illustrate the advantages of the etch-bleaching process of the present invention.

EXAMPLE 1

A photo plate was exposed in a conventional manner. Thereafter, the exposed photo plate was developed in a suitable liquid and then watered for approximately one minute and carefully flushed. An etch-bleaching solution was provided in a suitable bath. The solution consisted of a mixture of two parts:

Part A	
200 gms.	copper chloride
1000 ccm	glacial acetic acid
18 liters	water (H ₂ O);

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Part	B	
1800 ccm		hydrogen peroxide (H ₂ O ₂).

The parts, A and B, were mixed shortly before they were placed in the bath. After the photo plate was suspended vertically in the etch-bleaching solution, an ultrasonic source was submerged in the solution. The ultrasonic source was moved back and forth in a path parallel to the surface of the vertically suspended photo plate. After a sufficient period of time, the photo plate was rotated 180 degrees and was treated with ultrasonic sound waves on its opposite side. The ultrasonic etch-bleaching treatment lasted for a period of 8 minutes. Thereafter, the photo plate was watered, developed a second time and once again watered for one or two minutes. Finally, while the ultrasonic sound was applied to it, the photo plate was once more watered for a period of twenty to thirty seconds. The photo plate was then dried for a period of about thirty minutes.

The etch-bleaching treatment with the ultrasonic sound being applied to the photo plate was done with red lighting and the subsequent steps in ordinary daylight.

The gelatin particles were completely removed from the etch-bleach treated photo plate.

EXAMPLE 2

A similar photo plate was developed as in Example 1 and was treated in the same manner as in Example 1, except that the etch-bleaching solution included a Part A which instead of that provided in Example 1, consisted of:

Part A	
2160 gms	copper sulfate
2700 gms	citric acid
135 gms	sodium bromide
18 liters	water (H ₂ O)

This part A was mixed with a Part B consisting of 800 ccm of hydrogen peroxide (H₂O₂), a short period of time before it was used as the etch-bleaching bath for the photo plate. The photo plate was treated and

washed in the same manner as set forth in Example 1.

The treatment resulted in completely removing the gelatin particles from the photo plate.

5 From the above it is apparent that the present invention provides an improved means for etch-bleaching photo plate and films with the advantage that the gelatin particles are completely removed from the photo plate and/or film without the application of any additional mechanical means.

10 Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as might reasonably and properly come within the scope of our contribution to the art as defined in the appended claims.

We claim as our invention:

1. A method of physically removing gelatin particles during etch-bleaching of exposed and developed photo-plates, films and the like utilizing gelatin emulsions, said method comprising:

20 immersing the developed photo article in an etch-bleaching solution; and
 25 applying an ultrasonic sound, for at least a period of minutes to the immersed photo article from an ultrasonic source to apply mechanical force to the gelatin particles of the photo article, whereby and subsequently washing the photo article, preferably with a period of applied ultrasonic sound, such particles are thereby physically removed completely therefrom.

30 2. The method of claim 1, wherein the ultrasonic source is moved in a path parallel to the surface of said photo article.

35 3. The method of claim 2, wherein the ultrasonic source is moved in a reciprocating manner in said parallel path.

40 4. The method of claim 1, wherein the ultrasonic sound is applied for a period of about eight minutes.

5. The method of claim 1, wherein there are several ultrasonic sources applying sounds to the photo article in said etch-bleaching solution.

45 6. The method of claim 1, wherein said etch-bleaching solution includes copper cations.

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