Patented Oct. 21, 1947

2,429,317

UNITED STATES PATENT OFFICE

2,429,317

PROCESS FOR SHELLAC REFINING

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No Drawing. Application June 15, 1945, Serial No. 599,755

8 Claims. (Cl. 260—107)

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This invention relates to an improved process for effecting color improvement or bleaching of resins, such as shellac, which are soluble in alkaline aqueous solution.

Various methods have heretofore been proposed for the bleaching of resins of this type. Many such methods have involved the use of chemicals having a tendency to injure the material being bleached or requiring very careful critical control to avoid such injury.

I have discovered that resins of this type, and especially shellac, can effectively and economically be bleached to an exceptionally high degree without substantial degradation or danger of deleteriously affecting its desirable characteristics by subjecting the resin in aqueous solution to the action of a chlorite in the presence of an aldehyde, the solution being maintained alkaline.

In accordance with the process of my present invention, the resin to be bleached is subjected to the simultaneous action of a chlorite and an aldehyde in aqueous alkaline solution. Advantageously, the resin in aqueous alkaline solution is admixed with the chlorite and the aldehyde, the pH of the solution during the bleaching operation being maintained at not less than about 7 nor greater than about 11 and above that at which substantial precipitation will occur.

The function of the aldehyde in my improved bleaching process appears to be that of activating the chlorite rather than a direct action upon the resin itself. Thus activated, the chlorites, or reaction products thereof, are enabled to effect the bleaching of the resin in alkaline solution.

Various aldehydes may be used, including the aliphatic aldehydes, aromatic aldehydes, other carbocyclic aldehydes and heterocyclic aldehydes. For example, I have found formaldehyde, acetaldehyde, paraformaldehyde, furfural, benzaldehyde, and 5 and 6 carbon atom aldose sugars and inverted sugars to be particularly useful. All of these compounds are characterized by the CHO group. In addition to those highly soluble in water, the relatively insoluble aldehydes have been found to function satisfactorily in most instances.

Chlorites useful in my process are those sufficiently soluble in water to provide an adequate concentration to effect the desired bleaching. When the bleaching requirement is relatively low, less soluble chlorites may be used. However, for most purposes, I prefer the chlorites of the alkali and alkaline earth metal such as sodium chlorite, $NaClO_2$, and calcium chlorite $Ca(ClO_2)_2$.

Temperatures and concentrations are not usually critical and can be varied over a wide range. Increasing the temperature has generally been found to increase the rate of bleaching. Also, the ratio of chlorite to aldehyde may be widely varied. However, the molar ratio of chlorite to aldehyde of about 1:1 has been found to be generally useful.

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The optimum conditions with respect to temperature, concentration and ratio of chlorite to aldehyde, are, to a considerable extent, interdependent and will vary with the particular material being bleached, the degree of bleaching required, the length of the period of treatment and, to some extent, with the particular chlorite and aldehyde employed.

The temperature best suited for a particular operation will, to a considerable extent, depend upon the nature of the material being treated. Ordinary room temperatures may frequently be employed with advantage but higher temperatures are usually desirable. Temperatures at which the material being treated becomes unstable, or at which the material is deleteriously affected, are to be avoided. In the bleaching of shellac, temperatures in the neighborhood of 40° C. have been used with particular advantage.

The hydrogen ion concentration of my improved bleaching solution may be varied over a considerable range. However, it is essential that the solution be sufficiently alkaline to maintain the resin in solution. The alkalinity required to accomplish this purpose appears to depend somewhat upon the particular resin being bleached. It is usually desirable to employ a buffer to maintain the solution throughout the operation at a pH in excess of that where precipitation of the resin would occur.

An ordinary orange shellac, for instance, has been found to dissolve in an alkaline aqueous solution with a pH as low as 7.7. Where sufficient acid was added to lower the pH to 7.5, the shellac was observed to begin to precipitate out. Therefore in bleaching such shellac it is desirable to maintain the solution during the bleaching operation at a pH of 7.5 or higher, say between about 7.5 and about 11.

Generally satisfactory results have been obtained, in bleaching resins of the type described herein, where the pH is maintained within the range of about 7 to about 11.

Alkali metal phosphates such as the monosodium and di-sodium orthophosphates have been found to be particularly advantageous buffers for the purpose of the present invention, though other buffers may be used with advantage. In

the presence of such phosphates, the consumption of chlorite in the bleaching operations is materially reduced. In some instances, a saving of 50% of chlorite may be effected by the use of these phosphates in conjunction with the other constituents of my bleaching solution previously noted.

In carrying out the process, the chlorite may be admixed with the resin in aqueous alkaline solution and the aldehyde thereafter added or the aldehyde may be admixed with the resin in aqueous alkaline solution and the chlorite added to this mixture. The resultant mixture is maintained at a temperature usually ranging from room temperature to about 100° C. for a period of time sufficient to effect the desired bleaching and is thereafter cooled and precipitated. Instead of adding the chlorite and aldehyde separately, the two may be added together in aqueous solution, but such solutions should be used promptly upon mixing.

My invention will be further described and illustrated by a specific example of its application to the bleaching of shellac. It will be understood, however, that the utility of the invention is not restricted to the bleaching of shellac but that the invention is also applicable to the bleaching of similar resins.

Example I

118 parts of crude, reddish-brown-colored shellac was dissolved in a solution of 11.8 parts of soda ash in 1000 parts of water by boiling for 15 minutes. The solution was then passed through a coarse screen to remove foreign matter. To 100 parts of this solution there was added 1 part of available chlorine as sodium chlorite in 20 parts of aqueous solution and 0.78 part of a formaldehyde solution containing 0.22 parts of CH_2O. The solution was maintained for 1 hour at a temperature of 40° C. No buffer was used and the pH of the solution was between 7.5 and 8.2. By the end of this period of treatment, the original dark purple colored solution had been bleached to a light tan.

After the bleaching has been effected, the resin is precipitated from the solution in the usual manner and washed and dried.

By my improved process, a high degree of bleaching may thus be accomplished with economy in time and chemicals while avoiding deleteriously affecting the material being treated and the necessity of critical control of time, temperature and concentration heretofore required to avoid injuring the material.

The present application is in part a continuation of my co-pending application Serial No. 472,052, filed January 11, 1943.

I claim:

1. In the bleaching of resins of the shellac type, soluble in alkaline aqueous solution, the improvement which comprises subjecting the resin in alkaline aqueous solution to the action of a water-soluble chlorite in the presence of an aldehyde, the alkalinity of the solution being sufficient to maintain the resin in solution.

2. In the bleaching of shellac, the improvement which comprises subjecting the shellac in alkaline aqueous solution to the action of a water-soluble chlorite in the presence of an aldehyde, the alkalinity of the solution being sufficient to maintain the shellac in solution.

3. In the bleaching of shellac, the improvement which comprises subjecting the shellac in alkaline aqueous solution to the action of a chlorite of an alkali metal in the presence of an aldehyde, the alkalinity of the solution being sufficient to maintain the shellac in solution.

4. In the bleaching of shellac, the improvement which comprises subjecting the shellac in aqueous solution to the action of a water-soluble chlorite in the presence of an aldehyde at a pH within the range of about 7.5 to about 11.

5. In the bleaching of shellac, the improvement which comprises subjecting the shellac in aqueous solution to the action of sodium chlorite in the presence of an aldehyde at a pH within the range of about 7.5 to about 11.

6. In the bleaching of shellac, the improvement which comprises subjecting the shellac in aqueous solution to the action of a water-soluble chlorite in the presence of an aldehyde, and maintaining the hydrogen ion concentration of the mixture at a pH within the range of about 7.5 to about 11 by the presence of an alkali metal phosphate buffer.

7. In the bleaching of shellac, the improvement which comprises dissolving the shellac in an aqueous solution of soda ash, and subjecting the shellac in solution to the action of a water-soluble chlorite in the presence of an aldehyde, the pH of the solution being within the range of about 7.5 to about 11.

8. In the bleaching of shellac, the improvement which comprises subjecting the shellac in an alkaline aqueous solution to the action of a chlorite of an alkaline earth metal in the presence of an aldehyde, the alkalinity of the solution being sufficient to maintain the shellac in solution.

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