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CHLORITE BLEACHING OF FATTY ACID COMPOUNDS

Clifford A. Hampel, New York, N. Y., assignor to The Mathieson Alkali Works, Inc., New York, N. Y., a corporation of Virginia

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This invention relates to an improved process for effecting color improvement or bleaching of fatty acid compounds, including oils, fats, fatty acids, waxes, soaps and the like.

In accordance with the process of my present invention, the material to be bleached is subjected to the simultaaneous action of a chlorite and a persulfate in the presence of water. Advantageously, the material being treated is admixed with the chlorite and persulfate in aqueous solution, the pH of the solution during the bleaching operation generally being maintained at not less than about 7.

The term "persulfate" is employed herein and in the appended claims to designate a salt of persulfuric acid, i. e., $H_2S_2O_8$. The use of persulfates of the alkali metals and the alkaline earth metals especially sodium persulfate, $Na_2S_2O_8$, and potassium persulfate, $K_2S_2O_8$, has been found particularly desirable.

Various methods have heretofore been proposed for the bleaching of fatty acid compounds. Many of such methods have involved the use of acids and other strong chemicals which have a tendency to injure the material being bleached or require very careful, critical control to avoid such injury.

Many of these previously-proposed bleaching methods, especially those involving the use of acid solutions, tend to char or cause an undesirable reaction between the fatty acid compounds and the acid constituents of the solution and are not applicable to the treatment of many materials of this type, particularly soaps and other alkaline reacting materials.

I have discovered that fatty acid compounds can economically be bleached to an exceptionally high degree without substantial degradation or danger of deleteriously affecting their desired characteristics by subjecting them to the action of a chlorite in an alkaline or substantially neutral aqueous solution, in the presence of a persulfate as hereinafter more fully described.

The function of the persulfate in my improved bleaching process appears to be that of activating the chlorite rather than a direct action upon the fatty acid compound itself. Thus activated, the chlorites, or reaction products thereof, are enabled to effect the bleaching of the fatty acid compound either in an alkaline or substantially neutral environment.

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

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low, less soluble chlorites may be used. However, for most purposes, I prefer the chlorites of the alkali and alkaline earth metals such as sodium chlorite, $NaClO_2$, and calcium chlorite,

$$Ca(ClO_2)_2$$

Temperatures and concentrations are not usually critical and may 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 persulfate may be widely varied. However, a molar ratio of chlorite to persulfate of about 2:1 has been found generally useful.

The optimum operating conditions, with respect to temperature, concentration and ratio of chlorite to persulfate, are to a considerable extent interdependent and will also vary somewhat with the particular material being bleached, the degree of bleaching required, the length of the period of the treatment and, to some extent, with the particular chlorite and persulfate 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 temperature may frequently be employed with advantage but higher temperatures are usually desirable when treating fatty acid compounds normally solid where it is desired to effect the melting or solution thereof. Temperatures at which the material being treated becomes unstable or at which the material is deleteriously affected, are to be avoided.

Though the hydrogen ion concentration of my improved bleaching solution may be varied over a considerable range, a decided acid condition of the solution is generally to be avoided, as previously noted. Where the fatty acid compound being treated has an acid reaction, I have found it usually desirable to employ a buffer to maintain the solution substantially neutral, i. e., about pH 7, or on the alkaline side. The use of a buffer having the characteristics, and in sufficient quantity to maintain the solution at a pH of about 7, is generally desirable in the treatment of fatty acid compounds such as oils and waxes. In the bleaching of soap, a higher pH is usually desirable and no buffer need be employed.

Generally satisfactory results have been obtained where the pH is maintained at about 7 or higher, for instance within the range of about 7 to about 11. While solutions having a pH slightly lower than 7 may be used in the treatment of acid materials, such as fatty acids, and various other fatty acid compounds, with good results, a pH

substantially on the acid side should generally be avoided.

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. I have found that, in the presence of such phosphates, the consumption of chlorite in the bleaching operation is materially reduced. In some instances, a saving of 50% of chlorite has been effected by the use of these phosphates in conjunction with the other constituents of my bleaching solution previously noted.

My invention is applicable to the treatment of either natural or synthetic fatty acid compounds, including saponifiable oils and waxes, such as beeswax, carnauba wax, candelilla wax, corn oil, soybean oil and oleic acid, or commercial red oil. It is especially applicable to the bleaching of soaps and similar alkaline-reacting materials.

The bleaching of such fatty acid compounds is with advantage effected by treating the material while in a liquid condition, i. e., either molten or in aqueous solution or suspension, depending upon the characteristics of the particular material treated.

For example, such materials, either molten or in aqueous solution, may be admixed with the chlorite in the presence of water, and the persulfate thereafter added, or the material to be treated may be admixed with the persulfate in the presence of water 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 separated.

In the bleaching of soap, for instance, the soap may be melted by heating in water, the soap solution admixed with an aqueous chlorite solution and the desired amount of persulfate thereafter gradually added, or as a series of small portions, during agitation.

In the treatment of wax or the like, which is solid at normal temperatures, the material is with advantage melted and an aqueous solution of the chlorite and the persulfate admixed therewith or the chlorite and persulfate may be added separately.

My invention and its application will be further illustrated by the following specific examples:

Example I

50 parts of crude corn oil was heated in a boiling water bath to a temperature of about 100° C. and agitated by the passage of steam therethrough. 10 parts of an aqueous solution containing 0.5 part of available chlorine as sodium chlorite and 0.3 part of sodium persulfate were then added, and the steaming continued for one hour, the pH of the solution being maintained at about neutral. At the end of this period the available chlorine had been consumed and the oil was separated and drawn off. The resulting oil product was found to be bleached to an excellent light color, almost water white.

Example II

50 parts of a deep yellow cottonseed oil was treated by the same procedure of the preceding example and the resultant oil was similarly bleached, though it did not separate as readily as did the corn oil of the preceding example.

Example III

50 parts of dark colored beeswax was melted in a boiling water bath and agitated by the passage of steam therethrough. An aqueous sodium chlorite solution containing 0.5 part of available chlorine in 10 parts of solution was added to the melted wax and this was followed by the addition of 0.5 part of sodium persulfate in 10 parts of water, about 10% of the sodium persulfate solution being added at 5-minute intervals. After one hour of steaming at a temperature of about 100° C. and a pH of about 7, the available chlorine was completely consumed and the wax then separated. On cooling, the wax was found to be of a very good white color. Steaming of the dark colored wax for 2 hours in the absence of the chlorite and sodium persulfate had no effect on the color.

Example IV

200 parts of yellow laundry soap was melted in a boiling water bath and agitated by the passage of steam therethrough as before. 3 parts of available chlorine as sodium chlorite in about 45 parts of aqueous solution was then added followed by 5 parts of an aqueous solution containing 0.6 part of sodium persulfate at 10-minute intervals until 25 parts of the solution had been added. After steaming for five hours at a temperature of about 100° C. and a pH of about 9.3, all available chlorine had been consumed. The soap was then salted out, separated and poured into molds to set. By this treatment, the soap product was bleached to a very light color.

Example V

To 50 parts of red oil (oleic acid) heated in a boiling water bath to a temperature of about 100° C. and agitated by the passage of steam therethrough, there was added 1 part of available chlorine as sodium chlorite in 10 parts of aqueous solution. An aqueous solution containing 1 part of sodium persulfate in 10 parts of solution was prepared, and one-tenth of this solution was added at 5-minute intervals until the total had been added. After the final addition, about one hour of steaming was required to utilize all the available chlorine. At the end of this period, the fatty acid was separated and was found to be of a very pale yellow color.

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

The present application is a division of my copending application Serial No. 472,053, filed January 11, 1943.

I claim:

1. In the bleaching of fatty acid compounds, the improvement which comprises subjecting the material to be bleached to the action of an aqueous solution having a pH not less than about 7 and containing in solution a chlorite and a persulfate.

2. In the bleaching of fatty acid compounds, the improvement which comprises admixing the material to be bleached with a water soluble chlorite and a persulfate in the presence of water at a pH not less than about 7.

3. In the bleaching of fatty acid cmopounds, the improvement which comprises admixing the material to be bleached with a water soluble chlorite and a persulfate in the presence of water and

maintaining the hydrogen ion concentration of the mixture at a pH not less than about 7 by the presence of an alkali metal phosphate buffer.

4. In the bleaching of fatty acids, the improvement which comprises subjecting the material to be bleached to the action of an aqueous solution having a pH not less than about 7 and containing a chlorite of a metal of the group consisting of the alkali and alkaline earth metals and an alkali metal persulfate.

5. In the bleaching of soap, the improvement which comprises subjecting the soap to the action of an aqueous solution having a pH not less than about 7 and containing a chlorite of a metal of the group consisting of the alkali and alkaline earth metals and an alkali metal persulfate.

CLIFFORD A. HAMPEL.

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