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BLEACHING ALKYD RESINS

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4 Claims. (Cl. 260-8)

The invention relates to bleaching alkyd resins. Although alkyd resins are one of the lightest colored resins now in use for enamel vehicles, nevertheless, it is commercially desirable to have them even lighter in color than they are. I have discovered that it is possible to bleach alkyd resins to a very desirable degree by incorporating a small amount of bleaching agent directly into the batch before thinning. The bleaching agents which appear to be most successful are the three materials: citric, tartaric and oxalic acids.

While it is true that oxalic acid has been used as a general bleaching agent for such purposes as straw hats and for removing stains (U. S. Patent No. 1,032,229, Melchers, 1912), nevertheless it is impossible to use such materials as a bleaching agent for alkyd resins simply by incorporating them into the enamel. First of all, citric, tartaric and oxalic acids are water soluble materials and do not lend themselves conveniently to solution in such solvents as are customarily used in the commercial alkyd resins, such as toluol, xylol, high flash naphtha, hydrogenated naphtha or mineral spirits. While a certain amount of these acids might be incorporated by physical addition, such as grinding in with the pigment in a mill into the finished enamel, nevertheless experience has shown that this is not a satisfactory method because the dispersion of the bleaching substances is very imperfect. Secondly, an enamel consisting of pigment, solvent and alkyd resin in which the bleaching agent is added mechanically during the formation of the enamel, shows the disagreeable effect of "cratering" or surface irregularity due to the fact that in the baking of the enamel the bleaching agent reacts with free hydroxyl groups in the alkyd, liberating minute quantities of water. These minute quantities of water cause variations in surface tension which produce the irregularity in the enamel film.

I have found that when an alkyd resin is prepared the color may be considerably lightened if a very small amount (between 0.1% to 0.5%) of citric, tartaric or oxalic acid is added at the high temperature at which the resin is ordinarily cooked, just a short time before the resin is to be thinned. In this way, the small amount of the acid bleaching agent can accomplish the bleaching effect, react with the free hydroxyl groups, liberate the water vapor and become an integral part of the resin mass without destroying any of the good properties of the enamel. In this way, no water-soluble material is present in the enamel which might cause instability of the goods in the package during storage. Since the water vapor has been driven off already by the heating there will be no water driven off in the final enamel, which can cause irregularity of surface, yet, however, the much desired bleaching effect is accomplished. Depending upon how much bleaching agent is used, the color may be lightened as much as one to two full shades on the Hellige-Klett color scale for determining the original color on commercial alkyd resin solutions, thus rendering the product much more attractive for sale. Furthermore, the color of the enamel film after baking is vastly improved over that of an enamel which has been untreated.

Example 1

	Per cent
Phthalic anhydride	38.6
C. P. glycerine	25.4
Soya bean oil fatty acid	36.0
Total	100.0

These materals are heated together at 230–240° C. until a viscosity of M on the Gardner-Holdt scale is obtained for a 50% solution in xylol. At this point citric acid in the amount of one-fourth of one percent by weight of the total amount of resin ingredients is introduced. A certain amount of foaming takes place but not to any dangerous extent. The color is immediately bleached. After allowing the reaction to take effect and the vapors to evaporate (between one-half to three-fourths of an hour) the resin is withdrawn and thinned to a viscosity of approximately 0 on the Gardner-Holdt scale at a concentration of 50% in xylol.

Example 2

	Per cent
Phthalic anhydride	38.50
Glycerine	26.98
Linseed fatty acid	34.52
Total	100.00

The above materials were heated together at 230–240° C. until a viscosity of T—U on the Gardner-Holdt scale for a 50% solution of resin in hydrogenated naphtha is obtained. At this point 0.20% by weight of oxalic acid is incorporated, bleaching the color. The heating is continued in an inert atmosphere for one-half to three-quarters hour so as to allow the vapors to pass off. At a final viscosity of V—W in hydrogenated naphtha the resin is thinned and has a color a full shade lighter than the unbleached material.

In both these examples it is understood that the resin should be cooked under an inert atmosphere and that all the other usual precautions to keep the color light should be taken. In the bleaching process it is important that the bleaching operation be performed as near to the end of the cooking process as possible in order that the color may not return. The resin, if bleached at the start of the cook, instead of at the end, regains practically all the color which the bleaching agent has taken away and sometimes even ends up darker than it would have been had there been no bleaching agent introduced. Thus it is about as bad to bleach too soon as if it had never been bleached at all.

The use of this very small amount of polybasic acid as a bleaching agent is not to be confused with any processes known to the art wherein a relatively high amount of citric and tartaric acids are used as part of the main resin-forming ingredients. Resins which have been so described are invariably very poor on account of the lack of water resistance. In using this almost infinitesimally small amount of the agents, the bleaching action is accomplished without any of these deleterious effects when humidity and water resistance tests are made on the finished enamel. It is well known that alkyd resins cannot be produced from oxalic acid and glycerine at a temperature of 230–240° C. because the oxalic acid decomposes. It has been possible to form a resin from oxalic acid and glycerine if the temperature is kept very low for long periods of time, such as 24–72 hours, but this is not in accordance with practice which I have just discussed. Other hydroxy acids than citric or tartaric may be employed as bleaching agents, but the acids herein mentioned appear to be the best for the purpose because of availability and relatively low cost.

I claim:—

1. A process of bleaching alkyd resins which comprises incorporating in the resin during the course of manufacture 0.1–0.5% by weight, based on the total amount of resin ingredients, of an acid which is a member of a group consisting of citric, tartaric and oxalic, at a time long enough before the batch is thinned so that the products of reaction may escape and the bleaching effect take place, and at a temperature substantially above 200° C., the bleaching agent being added near the end of the cooking process.

2. A process as set forth in claim 1, wherein the bleaching agent is citric acid.

3. A process as set forth in claim 1, wherein the bleaching agent is tartaric acid.

4. A process as set forth in claim 1, wherein the bleaching agent is oxalic acid.

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