Patented May 14, 1940 2,200,298

UNITED STATES PATENT OFFICE

2,200,298

MODIFIED FATTY ALCOHOL AND PROCESS FOR PRODUCING SAME

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No Drawing. Application April 13, 1939, Serial No. 267,722

20 Claims. (Cl. 28—1)

This invention relates to modified fatty alcohols, more particularly to blown fatty alcohols having at least 8 carbon atoms.

Unsaturated fatty alcohol compositions having an iodine value above about 70 and comprising an unsaturated alcohol containing at least 8 carbon atoms are readily obtainable from natural products, such as sperm oil and other liquid and solid waxes, castor oil, teaseed oil and the like. It has been proposed to employ such unsaturated fatty alcohol compositions as textile lubricants, plasticizers, blending agents and the like in order to take advantage of their oily or fatty characteristics and their relatively low volatility. However, these compositions tend to become rancid and discolored after contact with air or other oxidizing influences and hence have not been extensively employed for such purposes.

U. S. Patent 2,087,603 describes a process for the production of an agent capable of increasing the oiliness in lubricants which involves blowing an alcohol containing at least 10 carbon atoms and having an iodine value below 70, preferably below 20. As above pointed out, there is a large and readily available supply of unsaturated fatty alcohol compositions comprising unsaturated alcohols containing at least 8 carbon atoms and having iodine values substantially above 70; however, the employment of such compositions in accordance with the process of the above patent requires preliminary steps involving hydrogenating the alcohols to reduce the iodine value thereof to substantially below 70 and preferably below 20. The necessity of carrying out this reduction step makes it uneconomical to practice the process of the above patent if fatty alcohol compositions having an iodine value substantially above 70 are employed as starting materials.

It is an object of this invention to produce fatty alcohol compositions stable to air and other oxidizing influences and especially suitable for treating textile materials from unsaturated fatty alcohol compositions having an iodine value substantially above 70, and comprising an unsaturated alcohol containing at least 8 carbon atoms.

I have now discovered that products of extensive technical importance and capable of a wide variety of uses may be prepared by blowing unsaturated fatty alcohol compositions having an iodine value above about 70, and comprising an unsaturated alcohol containing at least 8 carbon atoms. The products of my invention do not become rancid or discolored even upon prolonged exposure to air or other oxidizing influences and hence may be used for many purposes for which unblown unsaturated fatty alcohols are unsuitable. They are characterized by iodine values substantially lower than those of the unblown alcohol compositions and varying between about 25 and about 150. The acetyl values of the blown alcohol compositions are greater than those of the unblown compositions, the increase varying between about 2 and about 75. The viscosities of the unsaturated fatty alcohol compositions generally increase to some extent upon blowing, but the increase is not as great as the increase in the viscosity of fatty oils on blowing; this factor is of particular importance in the treatment of liquid fatty alcohol compositions, since the blown products remain fluid and may be easily handled, as contrasted with the highly viscous nature of blown oils.

The unsaturated fatty alcohol compositions which may be treated in accordance with my invention may comprise any of the unsaturated fatty alcohols containing at least 8 carbon atoms and having an iodine value above 70, including alcohols such as oleyl alcohol, ricinoleyl alcohol, linoleyl alcohol, alcohols prepared from oxidized petroleum fractions, wax alcohols, and unsaturated alcohols prepared by the reduction of fatty oils or fatty acids such as soybean oil, teaseed oil, oiticia oil, castor oil, olive oil, rice bran oil, fish fatty acids, etc. The unsaturated fatty alcohol compositions may contain appreciable amounts of saturated alcohols, such as, for example, stearyl alcohol, which may cause the mixture to exist in the form of a paste or a solid. Such compositions may also be treated in accordance with my invention, provided their iodine value is substantially above 70, by blowing a molten mass or a solution thereof. Accordingly, the term "unsaturated fatty alcohol compositions" when used in the specification and claims is intended to include not only relatively pure unsaturated fatty alcohols containing at least 8 carbon atoms, but also mixtures of these unsaturated fatty alcohols including those containing appreciable amounts of saturated fatty alcohols. Likewise, the term "blown fatty alcohol compositions" is intended to cover compositions produced by blowing the unsaturated fatty alcohol compositions.

The blown fatty alcohol compositions of my invention may be prepared by contacting an unsaturated fatty alcohol composition comprising an alcohol having at least 8 carbon atoms and having an iodine value above about 70 with air, oxygen, ozone, or mixtures thereof. The

contact may be effected by blowing the oxidizing agent through the unsaturated fatty alcohol composition in liquid form or dissolved in a suitable solvent therefor, such as dichlorethane, petroleum solvents such as solvent naphtha, xylene or isopropyl alcohol; or the fatty alcohol composition may be sprayed through a body of any of the above oxidizing agents. Any other suitable method of contact may be used. The blowing treatment may be carried out in the presence of catalysts such as, for example, metallic driers, peroxides, etc., to accelerate the reaction. The unsaturated fatty alcohol compositions may advantageously be mixed prior to blowing with a relatively small amount of water, e. g. about 10%, since I have found that the hydroxyl content and the surface activity of the blown alcohols are thereby substantially increased. The time of blowing may vary widely depending upon the characteristics desired in the final product; generally, however, between about 3 and about 36 hours are suitable. The blowing may be conducted at any desired temperature, but elevated temperatures, for example, between about 75° and about 200° C., are preferred.

The blown alcohol compositions obtained in accordance with the above process may be in liquid or solid form depending upon whether a liquid or solid fatty alcohol composition is treated. The exact constitution of the blown product is somewhat uncertain, but the product still displays alcoholic properties indicating the alcoholic hydroxyl group remains unaltered. The product has an iodine value substantially lower than that of the original alcohols, and which may vary between about 25 and about 150, preferably between about 40 and about 80 depending somewhat upon the conditions of blowing. The acetyl value of the alcohols increases substantially on blowing, the increase depending upon the conditions of blowing, particularly on whether water is mixed with the composition being blown, and varying between about 2 and about 75, preferably between about 4 and about 35. The color of the blown product may range from light amber to black depending somewhat upon the source of the unsaturated fatty alcohol composition treated. The light-colored products ordinarily need no further processing; they are either clear amber liquids or solids and have a pleasant odor and a characteristic oily feel. If the blown product posesses an undesirable dark color, this may be removed by distilling the product and recovering a light-colored blown alcohol composition from the distillate; if desired, the distillate may be treated with a bisulphite, such as sodium bisulphite, whereby impurities of a ketonic and aldehydic nature are removed. The light-colored distillate thus recovered resembles the light-colored products above described and may be used as desired.

The following examples are illustrative of my invention. Amounts are given in parts by weight.

EXAMPLE I

100 parts of oleyl alcohol having an iodine value of 87.6, an acetyl value of 177, and a viscosity of 110 at 38° C. were blown with air for 12 hours at a temperature of 140° C. A clear, amber, oily liquid was thereby obtained which had an iodine value of 76.1, an acetyl value of 181, and a viscosity of 205 at 38° C. This liquid did not become rancid even upon exposure to air for several weeks.

EXAMPLE II

100 parts of a mixture of fatty alcohols obtained by extracting saponified sperm oil with ethylene dichloride having an iodine value of 78.3, and an acetyl value of 192 were blown with air for 12 hours at 140° C. A dark-colored, oily product was thereby obtained which had an iodine value of 45, and an acetyl value of 211.3. This product was vacuum-distilled, using a water pump, and a clear, oily, amber-colored distillate recovered; the distillate comprised a mixture of alcohols and had an iodine value of 58 and an acetyl valve of 226. A black tarry residue left in the still was discarded.

The blown fatty alcohol compositions produced in accordance with my invention have been found to be particularly useful for finishing and lubricating textiles because of their oily characteristics and their property of remaining on the surface of textiles, such as cotton, wool, silk and rayon, after contact therewith. These compositions also act as de-electrifying agents when contacted with the textiles. Thus the blown alcohol compositions may be employed in compositions used for finishing, lubricating, lustering, soaking, sizing or otherwise conditioning textiles, such as wool, silk, cotton or rayon in accordance with methods well known in the art. The following represent examples illustrating particular compositions for treating textiles in which the blown alcohol compositions of my invention may be employed.

A. Finishing oil for silk, rayon, piece goods, knitwear

An aqueous emulsion was prepared containing 1 to 2% of a composition comprising 50 parts of the sulfonated isobutyl ester of sperm oil, 25 parts coconut oil, and 25 parts of blown alcohols obtained by blowing alcohols resulting from the reduction of teaseed oil. This emulsion was applied on a quetsch to a silk fabric followed by tenter frame drying. It was found the emulsion imparted to the fabric excellent softness and drape.

The above example was also carried out employing rayon fabric or knit goods, and the results were found to be equally desirable.

B. Silk soaking oil

15 parts of a composition comprising 50% blown oleyl alcohol and 50% sulfonated olive oil were prepared and added to 50 gallons of water. About 4 parts of sodium bicarbonate, 2 parts of glycerine, and 1 part of sodium carbonate were then added to the aqueous mass. 100 parts of silk in skein form were immersed in this composition for 6 hours, the silk then removed, hydroextracted and dried. Such a soaking treatment produced silk capable of being plied and thrown and then subsequently knit into a full-fashioned hose.

C. Wool lubricant

A composition comprising 10 parts of blown sperm oil alcohols, 10 parts of sulfated teaseed oil, and 50 parts of paraffin oil was prepared. This composition was applied straight to the extent of 4% to wool fibers during the batching operation. Such a treatment permitted the wool fibers to process easily and satisfactorily through the subsequent operations and yielded a yarn with sufficient strength for weaving purposes.

D. Yarn lubricant

A composition comprising 50 parts glyceryl mono-oleate, 50 parts blown ricinoleyl alcohol,

10 parts olive oil, and 10 parts isopropyl alcohol was prepared. The composition was emulsified in water and used in the last rinse on mercerized cotton yarns. Such yarns were capable of being knit so as to produce knit wear with a minimum number of courses per inch.

In addition to their employment as textile treating agents, the blown fatty alcohol compositions produced in accordance with my invention may also be employed in a variety of other manners; thus they may be used as plasticizers and defoamers for adhesives such as glue and casein; as auxiliary emulsifiers, blending aids and softeners in cosmetics; as pour point depressants in fuels and lubricants; as surface tension altering agents in insecticidal sprays; as dispersing, plasticizing and thickening agents for inks; in fat liquoring, waterproofing and softening of leather; as agents to increase the oiliness and to act as sludge dispersers in lubricants; as plasticizers and softeners in paints, varnishes, lacquers and resins; as dispersing agents in paper fillers; as demulsifiers for crude oil emulsions; in polishes and waxes for automobiles, shoes, floors, etc.; as oil-soluble dye dispersers; and as emulsifying and stabilizing aids in latex compositions. The blown alcohols may be reacted with inorganic acids, such as sulfuric acid and phosphoric acid, or derivatives thereof to produce inorganic neutral or acid esters having valuable properties; for example, the sulfates and phosphates of the blown alcohols possess excellent wetting and dispersing properties. The blown alcohols may also be condensed in any suitable manner with aromatic compounds, such as benzene, toluene, naphthalene, phenols and naphthols, and the condensation products then treated with sulfuric acid to give valuable wetting and dispersing agents. In addition to the above uses, it will be evident to those skilled in the art, in view of the properties of the compositions produced by my invention, that they may be used for many additional purposes to great advantage.

Since certain changes may be made in the above products and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A blown fatty alcohol composition having an iodine value between about 25 and about 150, and an acetyl value greater than that of the corresponding unsaturated fatty alcohol composition by an amount between about 2 and about 75.

2. A blown fatty alcohol composition having an iodine value between about 25 and about 150, an acetyl value greater than that of the corresponding unsaturated fatty alcohol composition by an amount between about 2 and about 75, and comprising an alcohol having at least 8 carbon atoms, said composition being obtainable by blowing an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms.

3. A composition for treating textiles comprising a blown fatty alcohol containing at least 8 carbon atoms and having an iodine value between about 40 and about 80, and an acetyl value greater than that of the corresponding unsaturated fatty alcohol by an amount between about 4 and about 35, said alcohol being obtainable by blowing an unsaturated fatty alcohol containing at least 8 carbon atoms and having an iodine value above about 70.

4. A composition for treating textiles comprising a blown fatty alcohol composition having an iodine value between about 40 and about 80, an acetyl value greater than that of the corresponding unsaturated fatty alcohol composition by an amount between about 4 and about 35, and comprising an alcohol having at least 8 carbon atoms and an appreciable amount of a substantially saturated fatty alcohol, said composition being obtainable by blowing an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms and appreciable amounts of a substantially saturated fatty alcohol.

5. Blown oleyl alcohol having an iodine value between about 40 and about 80, and an acetyl value greater than that of the oleyl alcohol by an amount between about 4 and about 35.

6. Blown sperm oil alcohols having an iodine value between about 40 and about 80, and an acetyl value greater than that of the sperm oil alcohols by an amount between about 4 and about 35.

7. Blown ricinoleyl alcohol having an iodine value between about 40 and about 80, and an acetyl value greater than that of the ricinoleyl alcohol by an amount between about 4 and about 35.

8. A process for preparing blown fatty alcohol compositions which comprises contacting an unsaturated fatty alcohol composition having an iodine value above about 70 with an oxidizing agent selected from the group consisting of air, oxygen, ozone, and mixtures thereof.

9. A process for preparing blown fatty alcohol compositions which comprises contacting an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms with an oxidizing agent selected from the group consisting of air, oxygen, ozone, and mixtures thereof at an elevated temperature.

10. A process for preparing blown fatty alcohol compositions for treating textiles which comprises contacting an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms with air at a temperature between about 75° and about 200° C. and for a time between about 3 and about 36 hours, distilling the blown product and recovering the desired product from the distillate.

11. A process for preparing blown fatty alcohol compositions for treating textiles which comprises contacting an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms with an oxidizing agent selected from the group consisting of air, oxygen, ozone and mixtures thereof in the presence of a relatively small amount of water.

12. A process for preparing blown fatty alcohol compositions which comprises blowing oleyl alcohol for between about 3 and about 36 hours at a temperature between about 75° and about 200° C.

13. A process for preparing blown fatty alcohol compositions which comprises blowing sperm oil alcohols for between about 3 and about 36 hours at a temperature between about 75° and about 200° C.

14. A process for preparing blown fatty alco-

hol compositions which comprises blowing ricinoleyl alcohol for between about 3 and about 36 hours at a temperature between about 75° and about 200° C.

15. A process of treating textiles which comprises treating a textile material with an agent comprising a blown fatty alcohol composition having an iodine value between about 25 and about 150, and an acetyl value greater than that of the corresponding unsaturated fatty alcohol composition by an amount between about 2 and about 75.

16. A process of treating textiles which comprises treating a textile material with an agent comprising a blown fatty alcohol composition having an iodine value between about 25 and about 150, and an acetyl value greater than that of the corresponding unsaturated fatty alcohol composition by an amount between about 2 and about 75, and comprising an alcohol having at least 8 carbon atoms, said blown fatty alcohol composition being obtainable by blowing an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms.

17. A process of treating textiles which comprises contacting a textile material with an agent comprising a blown fatty alcohol composition having an iodine value between about 40 and about 80, and an acetyl value greater than that of the corresponding unsaturated fatty alcohol composition by an amount between about 4 and about 35, and comprising an alcohol having at least 8 carbon atoms, said blown fatty alcohol composition being obtainable by blowing an unsaturated fatty alcohol composition having an iodine value above about 70 and containing an unsaturated alcohol having at least 8 carbon atoms.

18. A process of treating textiles which comprises contacting a textile material with an agent comprising blown oleyl alcohol having an iodine value between about 40 and about 80, and an acetyl value greater than that of oleyl alcohol by an amount between about 4 and about 35.

19. A process of treating textiles which comprises contacting a textile material with an agent comprising blown sperm oil alcohols having an iodine value between about 40 and about 80, and an acetyl value greater than that of the sperm oil alcohols by an amount between about 4 and about 35.

20. A process of treating textiles which comprises contacting a textile material with an agent comprising blown ricinoleyl alcohol having an iodine value between about 40 and about 80, and an acetyl value greater than that of ricinoleyl alcohol by an amount between about 4 and about 35.

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