

UNITED STATES PATENT OFFICE

2,063,575

DISPERSING OF PHENOLPHTHALEIN IN
MINERAL LUBRICATING OILSElmer Wade Adams, Hammond, Ind., assignor to
Standard Oil Company, Chicago, Ill., a corpora-
tion of IndianaNo Drawing. Application March 31, 1934,
Serial No. 718,529

8 Claims. (Cl. 87—9)

My invention relates to the dispersion of preferentially alcohol soluble materials in mineral oils. More particularly it relates to the dispersion of preferentially alcohol soluble materials in mineral oils by the use of an alcohol having a molecular weight greater than that of the propanols. Still more particularly it relates to the dispersion of preferentially alcohol soluble dye-stuffs and dye intermediates in mineral oils, particularly lubricating oils, by the use of alcohols having molecular weights greater than that of the propanols. My invention also relates to the products resulting from my new method of dispersion.

It has been proposed to provide a means for the identification of mineral oils by incorporating therein a small portion of an indicator or other relatively colorless material which will form a detectable color on treatment with a suitable chemical reagent. Thus, for instance, it has been proposed to provide a means for identifying lubricating oils by incorporating therein a trace of phenolphthalein (dihydroxyphthalophenone) which will form a brilliant red coloration when the oil is shaken with an aqueous alkaline solution. The idea is simple but it has not been satisfactorily accomplished in the past due to the difficulty of incorporating the phenolphthalein in the oil. Phenolphthalein, being preferentially soluble in water and the alcohols rather than in mineral oils, cannot readily be incorporated directly in the oil. Neither can it be incorporated satisfactorily in solution in such a material as ethanol. Thus, for example, when 0.25 ounce of phenolphthalein is dissolved in one pint of ethanol, the solution is added to 10,000 gallons of lubricating oil, and the phenolphthalein is distributed in the oil by the normal air blowing method, it is found that the phenolphthalein concentration in the oil diminishes gradually, due to precipitation, thereby destroying its quantitative value in detecting adulteration. Furthermore, when the solution of phenolphthalein in oil is filtered, for instance through ordinary filter paper, the phenolphthalein is completely removed.

I have overcome these difficulties by first dissolving the phenolphthalein in an alcohol, preferably a mono-hydroxy alcohol, having a molecular weight greater than that of the propanols, for instance: the butanols, the pentanols, the hexanols, the heptanols or mixtures of any of these with each other and/or with up to about

50% of methanol and/or ethanol. I prefer, however, to use normal butanol.

Thus, for instance, when 0.25 ounce of phenolphthalein is dissolved in one pint of normal butanol and the solution thus formed is added to 10,000 gallons of lubricating oil it can be distributed uniformly throughout the oil by agitating by the normal air blowing method without precipitation of the phenolphthalein. Furthermore, when the oil solution thus formed by the use of normal butanol is filtered, for instance through ordinary filter paper, the phenolphthalein is not removed as was the case when it was added in ethanol solution. I am not aware just what the reason is for the peculiar action of this relatively minute amount of higher alcohol, but I believe it may be attributed, to the formation of a loose chemical compound or alcoholate between the phenolphthalein and the higher alcohol.

The amount of phenolphthalein and the amount of alcohol can be varied within wide limits, thus, for instance, from 0.05 ounce to one pound or even more of phenolphthalein and from five ounces to 10 gallons or even more of alcohol having a molecular weight greater than that of the propanols, preferably normal butanol, can be used per 10,000 gallons of oil. The upper limits of both the phenolphthalein and the alcohol are determined by economic factors.

This method can be used in dispersing phenolphthalein in other mineral oils, for instance: gasoline, kerosene, furnace oil, fuel oil, etc. Other preferentially water or alcohol soluble indicators or dye intermediates can thus be distributed, for instance: phenylenediamine, methyl orange (the sodium salt of helianthine), bromophenol blue (tetrabromophenolsulfonphthalein), etc.

The same method can be utilized for introducing preferentially water or alcohol soluble dyestuffs in mineral oils, for instance: spirit dyes, such as alizarine (dihydroxy anthraquinone (1,2), eosine (tetrabromofluorescein) and its alkaline salts, fluorescein (resorcinphthalein), auramin, malachite green (tetramethyldi-aminotriphenyl-carbohydride hydrochloride), cyanine, etc.

Still other preferentially water or alcohol soluble materials such as antioxidants, antiknock improvers, etc. can thus be introduced.

The amount of preferentially alcohol soluble material to be added will, of course, vary greatly with the potency of the particular material chosen, the result to be accomplished, etc. In gen-

eral the amount will range from, say, 0.01 ounce to five pounds, or preferably .05 ounce to one pound, per 10,000 gallons of mineral oil. The amount of higher alcohol necessary to disperse this material in accordance with my invention will also vary greatly but, in general, may range from one ounce to 25 gallons, or preferably from five ounces to one gallon per 10,000 gallons of mineral oil.

While I have described my invention in connection with certain specific embodiments and in connection with certain theories of operation it is to be understood that these are by way of illustration rather than by way of limitation and I do not intend to be limited thereby except to the scope of the appended claims.

I claim:

1. A method of dispersing phenolphthalein in mineral lubricating oil, comprising dissolving approximately 0.25 ounce of phenolphthalein in approximately one pint of normal butanol, introducing the solution thus formed into approximately 10,000 gallons of mineral lubricating oil and distributing the said solution throughout the said oil by blowing with air.

2. Fluid oils, comprising the following materials in approximately the following proportions: mineral oil, 10,000 gallons; preferentially alcohol soluble material selected from the group consisting of the dyestuffs, the dye intermediates, the indicators, the antioxidants and the antiknock improvers, from 0.01 ounce to five pounds; a monohydroxy alcohol having a molecular weight great-

er than that of propanol, from one ounce to 25 gallons.

3. Fluid oils, comprising the following materials in approximately the following proportions: mineral lubricating oil, 10,000 gallons; phenolphthalein, 0.25 ounce; normal butanol, one pint.

4. The method of dispersing phenolphthalein in mineral lubricating oils comprising dissolving said phenolphthalein in normal butyl alcohol and introducing the solution thus formed into the mineral oil.

5. A fluid oil composition comprising a solution of mineral lubricating oil, phenolphthalein and normal butyl alcohol.

6. The method of dispersing phenolphthalein in a mineral lubricating oil comprising dissolving said phenolphthalein in a normally liquid aliphatic alcohol having a molecular weight greater than that of the propanols and introducing the solution thus formed into the mineral oil.

7. The method of dispersing phenolphthalein in mineral lubricating oils comprising dissolving said phenolphthalein in a normally liquid aliphatic alcohol having a molecular weight greater than that of the propanols, introducing the solution thus formed into the mineral oil, and agitating the admixture by blowing with air.

8. A fluid oil composition comprising a solution of mineral lubricating oil, phenolphthalein and a normally liquid aliphatic alcohol having a molecular weight greater than that of the propanols.

ELMER WADE ADAMS.

CERTIFICATE OF CORRECTION.

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ELMER WADE ADAMS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, strike out all of claim 2 and for the claim numbers "3", "4", "5", "6", "7", and "8" read 2, 3, 4, 5, 6, and 7 respectively; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of February, A. D. 1937.

Seal)

Henry Van Arsdale
Acting Commissioner of Patents.