

UNITED STATES PATENT OFFICE

2,205,191

1,4 ALKYL AMINO ANTHRAQUINONE

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No Drawing. Application July 30, 1938,
Serial No. 222,118

1 Claim. (Cl. 260—378)

This invention relates to alkyl substituted 1,4-diamino anthraquinones and more particularly to 1,4 di- (alkyl amino) anthraquinones.

A number of compounds have been prepared by substituting one or more of the amino groups of 1,4-diaminoanthraquinone, both aryl radicals. Some of these compounds have had some use in the dyeing of gasoline and similar petroleum products. They are, however, not very satisfactory for this purpose as their solubility in gasoline is extremely small and usually it has been necessary to dissolve the coloring matter in another solvent before using it for the coloring of liquid petroleum hydrocarbons. It has also been proposed to make 1,4 di- (methyl amino) anthraquinone and 1,4 di- (ethyl amino) anthraquinone, but these products likewise have very unsatisfactory solubility in paraffin hydrocarbons.

According to the present invention, higher 1,4 di- (alkyl amino) anthraquinones are prepared and show excellent solubility characteristics for petroleum hydrocarbons and are also useful in the coloring of other materials for which oil-soluble dyes are required. A particular advantage of the new coloring matters, is that they are much more intense than the corresponding arylamino compounds. As a result a smaller amount of coloring matter can be used which represents an important economy. While there is a very sharp difference between the alkyl amino anthraquinones having more than two carbon atoms in the alkyl chain as compared to the methyl and ethyl derivatives, the propylamino compounds are not as soluble in petroleum hydrocarbons as are the butyl and amyl compounds, particularly the amyl. Compounds with a still longer hydrocarbon chain show an increased solubility in gasoline. However, the solubility of the amyl compound is sufficiently high for practical purposes and the extremely high cost of hexyl, heptyl and octyl amines render the amyl derivatives commercially preferable in spite of the desirable characteristics of those compounds having longer carbon chains. The coloring matters are blue and show excellent light fastness, the shade varying only a little with the different alkyl groups.

The higher alkyl derivatives of 1,4 diamino anthraquinone may also be sulfonated to produce corresponding sulfonated coloring matters which are water-soluble, or rather, soluble in an aqueous alkali solution and can be used for dyeing animal fibres such as wool and silk. The sulfonated compounds do not show as great a practical advantage over the corresponding aryl de-

rivatives as do the unsulfonated ones and while they are included in the present invention and are excellent colors, the greatest economic importance resides in the unsulfonated products and particularly the diamyl derivatives.

While the present invention in its broader aspects is not limited to any particular method of producing the coloring matter, in a more specific aspect a new and improved process is included in the scope of the invention. This process consists in the reaction of leuco quinizarine with the corresponding alkyl amine, followed by reoxidization of the coloring matter. When a sulfonated dyestuff is desired, the unsulfonated dyestuff, after separation from the reaction mixture, is sulfonated in the usual manner using fuming sulfuric acid.

The invention will be described in greater detail in conjunction with the following specific examples which illustrate the production of typical dyestuffs falling under the present invention. It should be understood however that the invention is not limited to the details set forth in the examples. The parts are by weight:

Example 1

50 parts of leuco quinizarine are dispersed in 500 parts water and 50 parts of primary amyl amines are introduced together with 35 parts of sodium hydroxide and some 50 to 100 parts of sodium chloride. The temperature is maintained at 65 to 70° C. and agitation is maintained for six hours. If desired, sodium hydrosulfite may be added to prevent oxidation of the leuco quinizarine. After the reaction is completed the mixture is cooled down to room temperature and filtered. The presscake of the leuco compound is then dissolved in alcohol at room temperature and oxidized by adding a sufficient amount of sodium hypochlorite solution to convert all of the leuco compound into the actual dyestuff. Cold water is then added to completely precipitate the dyestuff and it is filtered off and dried. After drying the dyestuff is a bronzy crystalline product insoluble in water, soluble in concentrated sulfuric acid, aniline, pyridine, alcohol and petroleum hydrocarbons such as gasoline. The solutions of the dyestuff in petroleum hydrocarbons are deep blue in color and show excellent light fastness.

If a water-soluble dyestuff is desired, the dye is sulfonated in the usual manner producing an alkali soluble dyestuff with fuming sulfuric acid which dyes animal fibres various shades of blue,

Example 2

20 parts of leuco quinizarine and 20 parts of butylamine are heated in 200 parts of water at 60 to 65° C. for five hours with continuous agitation. After the reaction is complete the mixture is cooled to room temperature, filtered, and washed free of butylamine. The leuco compound is then dispersed in 250 parts of alcohol and oxidized by the addition of sodium hypochlorite. Water is then added to precipitate the dyestuff which is filtered, washed and dried. The dye

is similar in color to that of Example 1, but the solubility in petroleum hydrocarbons is somewhat less, though still sufficient to permit its use for coloring gasoline.

I claim:

Dyestuffs having the following formula:



in which R is an anthraquinone radical and the NHC₅H₁₁ groups are located in the 1 and 4 positions on the anthraquinone radical.

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