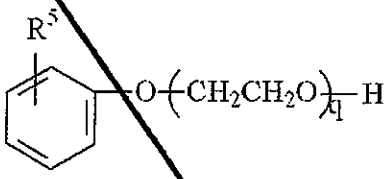
bis-acetoacetallylide pigment, dispersed using a styrene-acrylic acid copolymer as a dispersant (PTL 1).

The water-based pigment dispersion liquid produced in PTL 1 has excellent color development and light resistance, which are strong points of Pigment Yellow 155. However, when the water-based pigment dispersion liquid is used for an inkjet ink that needs to have good dischargeability and low viscosity, the pigment is not always sufficiently dispersed and the precipitation caused by aggregation of the pigment during storage cannot be sufficiently suppressed. In addition, to meet a recent demand for high-gloss image quality equivalent to quality of film photos, pigment particles need to be dispersed so as to have a smaller particle size. Therefore, there has been a strong demand for addressing the above-described problems.

The applicants have significantly reduced the precipitation caused by aggregation of a pigment and have significantly improved the dispersion stability of the water-based pigment dispersion by adding a diol compound having a specific structure in a kneading step of a pigment to prepare a pigment dispersion which contains the diol compound and is in a solid form at room temperature and then by dispersing the pigment dispersion in a water-based medium (refer to PTL 2). However, since Yellow 155 is a pigment whose particles are not easily dispersed finely and pigments

[Chem. 19]



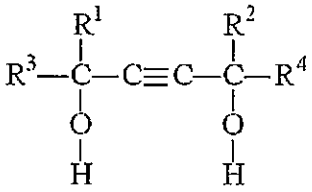
(3)

(q represents an integer of 1 to 30 and R5 represents a linear or branched alkyl group having 7 to 11 carbon atoms) is more preferably polyoxyethylene nonylphenyl ether and q preferably represents an integer of 1 to 20.

When the acetylene glycol compound represented by the general formula (2) below

[0040]

[Chem. 20]



(2)

(in the formula, R1, R2, R3, and R4 each independently represent a linear or branched alkyl group having 1 to 8 carbon atoms in its main chain) is used together with the above-described ether compound, the mixing ratio of ether compound/acetylene glycol compound (e) is preferably 80/100 or less by mass. In the present invention, when such a mixture is used, the total amount of the ether compound and the compound represented by the general formula (1) is

viscosity of ink easily increases and the dischargeability of the ink tends to decrease.

The mass ratio (b)/(a) of the styrene-acrylic acid copolymer (b) to the bis-acetoacetallylide pigment (a) is preferably 10/100 to 40/100. By setting the amount of styrene-acrylic acid copolymer (b) added in this range, the disintegration of the pigment efficiently proceeds. Furthermore, when the water-based pigment dispersion liquid is produced, an increase in the viscosity of the dispersion liquid and a decrease in the dischargeability of an inkjet recording ink that are caused by presence of an excessive pigment that has not adsorbed onto the pigment in a water-based medium are prevented.

[0054]

When an alkali metal hydroxide is used as the basic compound (c), the alkali metal hydroxide is normally used in the form of an aqueous solution. Herein, the amount of water is preferably minimized. The ratio of the amount of water relative to the amount of pigment is preferably 15% or less by mass and more preferably 8% or less by mass. In the present invention, the viscosity of the water-based dispersion liquid is preferably less than 4.0 mPa·s and more preferably less than 3.5 mPa·s at room temperature. When the viscosity of the water-based pigment dispersion liquid is in such a low viscosity range, an inkjet recording ink

volume: 2 L) with a centrifugal force of 18900 G at a temperature of 35°C for a residence time of 12 minutes to obtain a water-based pigment dispersion having a pigment concentration of 15.2% by mass.

Furthermore, an inkjet recording ink having a pigment concentration of 4% by mass was produced using the obtained water-based pigment dispersion liquid and the components below.

Aqueous pigment dispersion liquid: 5.52 parts

2-Pyrrolidinone: 1.60 parts

Triethylene glycol monobutyl ether: 1.60 parts

Acetylene glycol surfactant, Surfynol 440 (manufactured by Nissin Chemical Industry Co., Ltd.): 0.10 parts

Glycerin: 0.60 parts

Ion-exchanged water: about 11 parts

[0068]

<Example 2>

A water-based pigment dispersion liquid was produced as in Example 1, except that the amount of Surfynol CT211 added was changed from 15 parts (3% of pigment) to 5 parts (1% of pigment). An inkjet recording ink having a pigment concentration of 4% by mass was prepared from the water-based pigment dispersion liquid as in Example 1.

<Example 3>

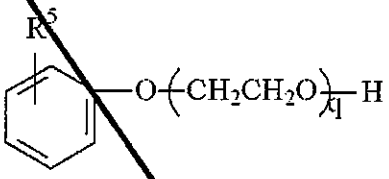
A water-based pigment dispersion liquid was produced as

[0077]

As is clear from Table 1, the water-based pigment dispersion liquids in Examples 1 to 10 have a small volume-average particle size and good precipitation property in the vial test. In the inkjet recording inks produced from the water-based pigment dispersion liquids, the particle size does not increase even after the long-term storage at 70°C. When an image is formed using each of the inks, higher gloss is achieved compared with gloss in Comparative Examples.

If acetylene glycol surfactants whose HLB value is outside the range of 8 to 12 are used, the amount of precipitation increases in the vial test and gloss degrades (Comparative Examples 2 to 6). The range of the acid value of the styrene-acrylic acid copolymer (b) (Comparative Examples 7 to 9) and the range of the mass ratio (e)/(a) of the kneading aid (e) to the bis-acetoacet pigment (Comparative Examples 10 and 11) specified in the present invention are important. It is clear that, if such ranges are outside the ranges specified in the present invention, the amount of precipitation increases and gloss degrades.

Furthermore, an effect of the kneading aid (e) on C.I. Pigment Yellow 185 was confirmed. However, even if kneading is performed with the kneading aid (e) used in the present invention, a decrease in the amount of precipitation or an increase in gloss was not confirmed. It was found that the

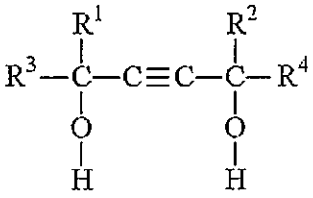


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(q represents an integer of 1 to 30 and R5 represents a linear or branched alkyl group having 7 to 11 carbon atoms); the kneading aid (e) has an HLB value of 8 to 12; the mass ratio (e)/(a) of the kneading aid (e) to the bis-acetoacetallylide pigment (a) is 0.5/100 to 7/100; and the acid value of the styrene-acrylic acid copolymer (b) used in the kneading step is 145 to 175.

[Claim 14]

The method for producing a water-based pigment dispersion liquid according to Claim 13, wherein the surfactant (e) contains a surfactant composed of a mixture containing the compound represented by the general formula (2) below



(2)

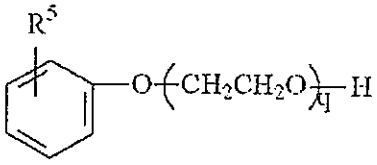
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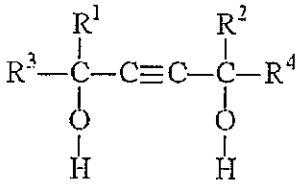
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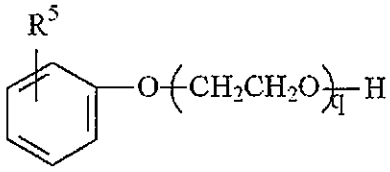
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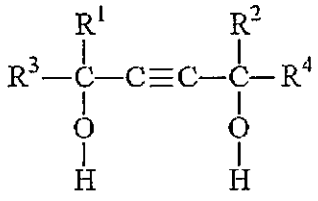


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[Claim 14]

The method for producing a water-based pigment dispersion liquid according to Claim 13, wherein the kneading aid (e) contains a surfactant composed of a mixture containing the compound represented by the general formula (2) below



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