quantitative method containing the following steps (1) to (3):

(1) Extraction of Free Silicone Oil

A sample toner is soaked in chloroform, stirred, and left to stand.

To the solids obtained after removing a supernatant liquid by centrifugal separation, chloroform is added, and the resultant is stirred, and left to stand. This operation is repeated to remove free silicone oil from the sample.

(2) Determination of Carbon Content

The carbon content of the sample from which the free silicone oil has been removed is measured by CHN elemental analyzer (CHN corder MT-5 (of Yanaco Co., Ltd.)).

(3) Determination of Free Silicone Oil Amount

An amount of the free silicone oil is obtained by the following equation (1).

Free silicone oil amount = (CO—C1)/Cx100x~~40~~ 37/12(% by mass)

Equation (1)

In the equation above, "C" is a carbon content (% by mass) of the silicone oil treating agent, "CO" is a carbon content (% by mass) of the sample before the extraction, "C1" is a carbon content (% by mass) of the sample after the extraction, and the coefficient "~~40~~ 37/12" is the conversion factor for converting from the C (carbon) amount in the structure of the polydimethyl siloxane to the total amount

invention was evaluated when the toner was used as a one component developer. The toner of the present invention however can be used for a two-component developer by subjecting to a suitable external additive treatment, and using a suitable carrier.

<Measurement Method of Free Silicone Oil Amount>

The amount of the free silicone oil (free silicone oil amount) in the toner was measured by a quantitative method containing the following steps (1) to (3):

(1) Extraction of Free Silicone Oil

A sample toner was soaked in chloroform, stirred, and left to stand.

To the solids obtained after removing a supernatant liquid by centrifugal separation, chloroform was added, and the resultant was stirred, and left to stand. This operation was repeated to remove free silicone oil from the sample.

(2) Determination of Carbon Content

The carbon content of the sample from which the free silicone oil had been removed was measured by CHN elemental analyzer (CHN corder MT-5 (of Yanaco Co., Ltd.)).

(3) Determination of Free Silicone Oil Amount

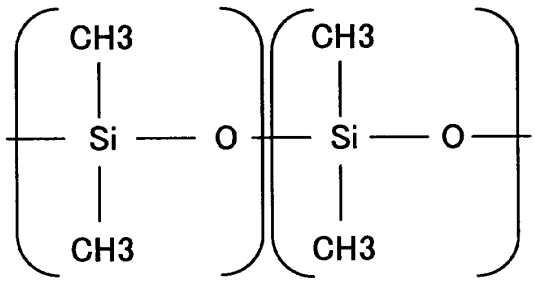
An amount of the free silicone oil was obtained by the following equation (1).

Free silicone oil amount = (CO-C1)/Cx100x~~40~~ 37/12(% by mass)

Equation (1)

In the equation above, "C" is a carbon content (% by mass) of the silicone oil treating agent, "CO" is a carbon content (% by mass) of the sample before the extraction, "Cl" is a carbon content (% by mass) of the sample after the extraction, and the coefficient "~~40~~ 37/12" is the conversion factor for converting from the C (carbon) amount in the structure of the polydimethyl siloxane to the total amount

The structural formula of the polydimethyl siloxane is presented below:



(Particle Size Distribution of Toner)

The measurement method of the particle size distribution of the toner particles will be explained next.

As for the measuring device of the particle size distribution of the toner particles according to a counter method, Coulter Counter TA-II or Coulter Multisizer II (both manufactured by Beckman Coulter, Inc.) was used. The measuring method is as follow.

First, 0.1 mL to 5 mL of a surfactant (alkylbenzene sulfonate) was added as a dispersant to 100 mL to 150 mL of an

CLAIMS

1. A toner, comprising:

a binder resin;

a colorant; and

a silicone oil-treated external additive,

wherein the silicone oil-treated external additive contains free silicone oil, and a total amount of the free silicone oil is 0.2% by mass to 0.5% by mass relative to the toner, and

wherein the toner has the average circularity of 0.96 to 1.

2. The toner according to claim 1, wherein the external additive has BET specific surface area of 10 m^2/g to 50 m^2/g.

3. The toner according to any of claim 1 or 2, wherein the external additive has the average primary particle diameter of 30 nm to 150 nm.

4. The toner according to any one of claims 1 to 3, wherein the external additive is at least one selected from the group consisting of silica, titania, and alumina.

5. The toner according to any one of claims 1 to 4, wherein the external additive is silica.

6. The toner according to any one of claims 1 to 5, wherein the silicone oil-treated external additive contains silicone oil in an amount of 2 mg/m^2 to 10 mg/m^2 with respect to the surface area of the external additive.

7. An image forming apparatus~~image~~, comprising: