

A PARTICULATE DRY TINTER COMPRISING AT LEAST TWO PIGMENTS PROCESS FOR ITS
PREPARING AND USE IN A COATING COMPOSITION

The present invention relates to a particulate dry tinter and a process for its production.

Coating compositions for example paints, lacquers, varnishes and wood stains for use in decorating buildings, their fixtures and fittings, are supplied as either ready mixed products, where colour is added at the point of manufacture, or as tinted products, where colour is added at the point of purchase.

Generally speaking the range of ready mixed colours that can be made available is limited because available in-store display space is limited. In-store tinting allows a very wide range of colours to be made available in-store as less display space is required. The availability of a wide range of colours is particularly important to professional painters and decorators and to increasing numbers of consumers who are more adventurous about interior decoration or who wish to personalise their homes.

In-store tinting comprises adding to a base paint, one or more pigment-containing tinters according to a recipe to produce a particular predetermined colour. Tinters generally comprise a dispersion of a single pigment in a liquid carrier. For emulsion paint the carrier will be aqueous. The base paint can be a standard white paint or a base paint particularly formulated for tinting.

Tinting is normally carried out in-store using a computer-controlled tinting machine. However, in some markets, professional painters and decorators and some consumers prefer to tint paint by hand on site prior to application. When tinting in this way, the tinters, normally liquid tinters, can be added to the base paint according to a predetermined recipe or by eye to produce the required colour.

Tinting by hand presents a number of difficulties. The first is ensuring consistency of colour between successive batches or tinted paint. The second is that spillage of tinter is particularly hazardous since their colours are relatively intense and therefore difficult to remove.

Tinting by hand can also be carried out using **dry powder** tinters. Known tinters generally comprise a single coloured pigment and are more difficult to mix than are liquid tinters. So the problem of batch to batch variation, which is inherent in this form of tinting, is made far worse where the desired end colour requires mixing two powder tinters. Further, powder tinters containing more than one coloured pigment have a non-uniform appearance and unlike bi- and multi-pigmented liquid tinters, their colour does not resemble the colour that they will impart to the base paint to be tinted.

According to the present invention there is provided a particular dry tinter for use in tinting a coating composition and comprising at least two coloured pigments where the tinter has a colour predictive of the colour of the tinted coating composition and of the coating composition when applied.

The tinters of this invention have a number of benefits. First, as they are dried powders, they can be measured out more accurately than can liquid tinters, thereby minimising batch to batch colour variations. Secondly, tinting to produce a mixed colour (ie, one requiring two pigments) can be done more accurately. Thirdly, because the powders are predictive of the colour of the tinted paint, the consumer can buy with confidence knowing what the eventual colour of the painted surface will be. Fourthly, they allow the professional painter and decorator to tint by eye with confidence. These tinters can also be used as the basis of a dry powder tinting scheme to be used in-store.

The tinters of this invention are particulate and have mean particle size in the range of 80 and 400 μ m inclusive. Examples of lower limits for mean particle size range are 85 and 90 μ m. Examples of upper limits for the particle size range are 275, 300, 325, 350 and 375 μ m.

Examples of pigments for use in the tinters of the present invention include:

Mono azo pigments, for example C.I. Pigment Red 112, C.I. Pigment Yellow 74, and C.I. Pigment Orange 67;

Iron oxide pigments, for example C.I. Pigment Red 101 and C.I. Pigment Yellow 42;

Phthalocyanine pigments, for example C.I. Pigment Blue 15:3, C.I. Pigment Blue 15:4 and C.I. Pigment Green 7;

Dioxazine pigments, for example C.I. Pigment Violet 23;

Quinacridone pigments, for example C.I. Pigment Red 122;

Diketo-pyrrolo-pyrrole pigments, for example C.I. Pigment Red 255;

Quinophthalone pigments, for example C.I. Pigment Yellow 138;

Black pigments, for example Carbon black C.I. Pigment Black 6 and Furnace carbon black C.I. Pigment Black 7 and

White pigment, for example C.I. Pigment White 5 Titanium Dioxide.

Such pigments are commercially available, for example, from BASF, Clariant, Ciba, Degussa, Elementis and Rockwood.

In practice, the tinters of the present invention will usually contain a filler pigment. A filler pigment is a substance which has pigment-like properties but has little or no affect on hue although it will reduce the chroma (that is the intensity) of the hue. In colloquial terms, they lighten the shade of colour. For the tinters of the present invention they also improve their incorporation into the base paint and improve other properties for example rheology.

Examples of filler pigments are calcium carbonate, aluminium silicate and clays, particularly kaolin and china clay.

The amount of filler pigment employed in any particular composition depends primarily upon the colour required in the final tinter. That will be a matter of taste and the proportion of filler pigment to coloured pigment will be adjusted accordingly. The precise amounts for any particular tinter can be determined by routine experimentation.

In practice, the filler pigment can be present in the tinter in an amount of from 40wt% to 90wt% of the tinter. For example, it can be from 45, 50 or 55 to 80 or 85 wt% of the tinter.

The tinters of this invention will in practice comprise a dispersing agent. The dispersing agent can be a non-ionic or anionic surfactant or a mixture of the two. It can also comprise a small amount of an auxiliary surfactant.

Examples of non-ionic surfactants for use in the tinters of the present invention include alkyl glucosides, polyglucosides esters, cyclic ether esters, alcohol ethoxylates and fatty acid amide ethoxylates.

Examples of alkylglucosides are C₆-C₁₂ alkylglucosides, for example decyl polyglucoside. Examples of cyclic ethers are sorbitan esters, for example the Tween and Span range of surfactants. Examples of alcohol ethoxylates include C₈-C₁₆ alkyl ethoxylates and in particular dodecyl ethoxylate.

The fatty acid component of the fatty acid amide ethoxylates can be derived from hexanoic, octanoic, decanoic, dodecanoic, tetradecanoic (or myristic) hexadecanoic (or palmitic) or octadecanoic (or stearic) acid. The acid may also be a mixture of fatty acids as for example, coco fatty acid, which is a mixture of C₈-C₁₈ fatty acids derived from natural sources. The fatty acid component can also be mono- or di-unsaturated as for example in oleic or linoelic acids.

The ethoxylate component can contain from 1-12 and particularly 4 ethoxylate groups.

The molecular weight of such ethoxylated fatty amides can lie in the range from 200 to 1000 inclusive.

Example of minima for the molecular weight range are 250, 275 and 300. Examples of maxima for the molecular weight range are 600, 700, 750, 800, 850 and 900. In particular the range is from 320 to 820 inclusive.

The dispersing agents referred to above are commercially available from Akzo Nobel.

The proportion of dispersant used in the tinter compositions of the present invention depends upon the dispersant or dispersant combination employed and the particular

pigment, that is the coloured pigments and filler pigments. The precise amount in any particular case can be determined by routine experimentation. As a general rule the total dispersant will not exceed 20wt% of tinter and will generally not be less than 5wt%. Typically the upper limit can be 15wt% and the lower limit 10wt%.

Where the dispersant is a mixture, the larger component is the non-ionic dispersant which can be present in an amount from 1.0-15wt% inclusive. The anionic dispersant will be present in an amount from 0.1-5wt% but will not exceed the amount of non-ionic surfactant.

For example, where the non-ionic dispersant is an alkylglucoside, polyglucoside or fatty acid ethoxylate, it can be present in an amount up to 15wt% of the tinter. In practice, the non-ionic dispersant will often be a mixture. The alkylglucoside will be the major component being from 7wt% to 10wt% of the tinter. The balance of the tinter can be made up of either fatty acid amide or alcohol ethoxylate or a mixture. Usually the ethoxylate will not exceed 5wt% of the tinter.

Where the anionic surfactant is an ethoxylated phosphated alcohol it does not exceed 2.0wt%. Examples of minima in both cases are 0.1 and 0.2 wt%. Examples of maxima are 1.0, 1.1, 1.2, 1.5 and 2.0 wt%. Similarly, where an awaiting surfactant, for example soya bean lecithin, is present that too will not exceed 2wt%.

The tinter compositions of this invention may also comprise additives commonly used in liquid tinters, for example preservatives, defoamers and humectants.

Examples of preservatives include biocides, in particular Bronopol / (CIT/MIT). Examples of defoamers are polysiloxanes. The amount of optional components to be used in a particular formulation can be determined by routine experimentation. Preservatives and defoamers are generally present in small amounts from 0.5-2.0wt% inclusive. Humectants can be used up to 5wt%. These additives are commercially available.

The tinters of the present invention are made by a process which comprises mixing at least two colour pigments, a dispersant and optionally a filler pigment in the presence

of a liquid carrier to form an homogenous tinter dispersion mixture and thereafter drying the tinter dispersion to form particles.

Preferably, separate single pigment pre-dispersions are made from each of the coloured pigments to be mixed and the dispersing agent and a liquid carrier. For emulsion paints the liquid carrier is water. These pre-dispersions are mixed together and with any filler pigments for filler pigment pre-dispersion and other optional components to form a tinter dispersion. Any optional components can be added as a pre-dispersion or as part of the filler pigment pre-dispersion. The tinter dispersion so obtained can be dried batchwise in an oven and thereafter, if necessary, milled to produce a powder. Preferably however, the tinter dispersion is spray dried. Spray drying produces a particulate tinter where the powder is of a generally uniform particular size and is more homogeneous than is produced by batch oven drying.

In use the powder tinters of the present invention are stirred into a base paint either according to a predetermined recipe or adjusted by eye to produce the desired shade of colour.

The following examples illustrate the invention.

Example 1

Preparation of a particulate dry tinter.

Figure 1 is the schematic representation of the process for producing a particulate dry tinter according to the present invention.

Referring to Figure 1, coloured pigments 20, 22 and 24 were each dispersed in a liquid carrier 21, 23 and 25 to produce predispersions 31, 33 and 35. The make-up of these dispersions is set out in Tables 1 to 3 respectively. The predispersions 31, 33 and 35 in the proportions set out in Table 5 were mixed together for 20 minutes in a high speed disperser with tinter extender 40 being a mixture of the components set out in Table 4. The mixture was then oven dried at a temperature between 60 and 100°C

for 8 hours to produce a granular powder having a mean particle size in the range 100 to 250 μ m.

Example 2

A second tinter was made according to the process of Example 1 substituting the extender tinter of Table 4 with the extender tinter of Table 6.

Table 1

Pre-dispersion 31 Components	Chemical Name	Wt% in dispersion	Wt% in tinter
Liquid Carrier	Water	34.7	0.00
Humectant	Propylene Glycol	2.5	3.92
Humectant	Polyethylene Glycol	4.2	6.59
Dispersing Agent	Ethoxylated phosphated alcohol	0.96	1.52
Dispersing Agent	Fatty acid ethanolamide	7.62	10.14
Defoamer	Polysiloxane	0.3	0.27
Coloured Pigment	Copper phthalocyanine	44.4	69.67
Filler Pigment	Aluminium Silicate	5.0	7.78
Preserving Agent	Bronopol / (CIT/MIT)	0.3	0.10

Table 2

Pre-dispersion 33 Components	Chemical Name	Wt% in dispersion	Wt% in tinter
Liquid Carrier	Water	44.17	0.00
Humectant	Glycerol	2.4	0.00
Humectant	Polyethylene Glycol	4.20	7.88
Dispersing Agent	Soya Lecithin	1.57	2.94
Dispersing Agent	Fatty acid ethanolamide	6.04	10.98
Defoamer	Polysiloxane	0.3	0.34
Coloured Pigment	Carbon Black	20.01	37.56

Filler Pigment	Aluminium Silicate	21.01	40.11
Preserving Agent	Bronopol / (CIT/MIT)	0.3	0.19

Table 3

Pre-dispersion 35 Components	Chemical Name	Wt% in dispersion	Wt% in tinter
Liquid Carrier	Water	59.08	0.00
Humectant	Propylene Glycol	2.6	6.47
Humectant	Polyethylene Glycol	4.28	10.64
Dispersing Agent	Ethoxylated phosphated alcohol	2.66	6.61
Dispersing Agent	Soya Lecithin	3.69	9.18
Dispersing Agent	Fatty acid ethanolamide	2.79	5.55
Defoamer	Defoamer	0.3	0.44
Coloured Pigment	Quinacridone	24.3	60.42
Preserving Agent	Bronopol / (CIT/MIT)	0.3	0.69

Table 4

Filler Pigment Pre-dispersion 40 Components	Chemical Name	Wt% in dispersion	Wt% in tinter
Liquid Carrier	Water	30.75	0.00
Dispersing Agent	Ethoxylated phosphated alcohol	7.0	9.11
Dispersing Agent	Fatty acid ethanolamide	4.6	4.91
Preserving agent	Bronopol / (CIT/MIT)	0.1	0.04
Filler Pigment	Aluminium Silicate	57	85.45
Defoamer	Polysiloxane	0.55	0.49

Table 5

Tinter Dispersion 28 Components	Wt% in dispersion
Extender Tinter Pre-dispersion 40	85.00
Pre-dispersion 31	6.77
Pre-dispersion 33	1.50
Pre-dispersion 35	6.73

Table 6

Filler Pigment Pre-dispersion Components	Chemical Name	Wt% in dispersion	Wt% in tinter
Liquid Carrier	Water	30.75	0.00
Dispersing Agent	Fatty acid ethanolamide (non-ionic surfactant)	11.6	14.02
Preserving agent	Bronopol / (CIT/MIT)	0.1	0.04
Filler Pigment	Aluminium Silicate	57	85.45
Defoamer	Defoamer	0.55	0.49

Claims

1. A particulate dry tinter for use in tinting a coating composition including at least two coloured pigments, each coloured pigment being provided in an aqueous pre-dispersion, in which the at least two aqueous pre-dispersions are mixed together in the presence of a dispersant to form a tinter dispersion, the tinter dispersion being dried to form the particulate dry tinter having a colour hue predictive of the colour of the tinted coating composition and the coating when applied.
2. A tinter according to claim 1 having a mean particle size in their range of 80µm and 400µm inclusive.
3. A tinter according to claim 1 or claim 2 comprising a filler pigment.
4. A tinter according to any one of claims 1 to 3 comprising at least one dispersing agent.
5. A tinter according to claim 4 where the dispersing agent is non-ionic.
6. A tinter according to claim 5 where the dispersing agent is anionic.
7. A process for preparing a tinter according to any one of claims 1 to 6 in which the at least two aqueous pre-dispersions are mixed together in the presence of a filler pigment.
8. A coloured coating composition coloured with a tinter according to claims 1 to 6.