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TINTING PASTE VEHICLES AND USE OF SAME

Franz Leipen, Toronto, Ontario, Canada, assignor to W. A. Cleary Corporation, New Brunswick, N.J., a corporation of New Jersey

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This invention relates to liquid tinting paste vehicles which are compatible with organic as well as aqueous solvent paint systems and the use of same.

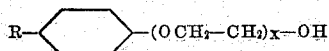
During the last decade countless attempts have been made to develop a universal tinting paste vehicle which is compatible with organic as well as aqueous solvent paint systems. Although products are commercially available that have a somewhat broad range of compatibility, such products generally lack compatibility with polyvinyl acetate paints.

My invention contemplates a universal tinting paste vehicle which is compatible with a broad variety of paints, including polyvinyl acetate paints.

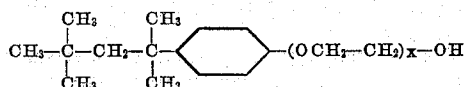
Briefly, my tinting paste vehicle has the following characteristics:

- Compatibility with conventional paint vehicles;
- Tinting pastes based on my vehicle are easily dispersed; and
- Full color is developed in organic and aqueous solvent paint systems.

My substantially homogeneous tinting paste vehicle contains linseed oil, preferably alkali refined linseed oil, and nonionic surface active agent belonging to the class of alkyl (e.g., tertiary alkyl) phenoxypolyethylene glycols having the following general formula:



wherein R is an octyl or nonyl group (i.e., iso-octyl and isononyl) and X is 3-10 inclusive, preferably about 5-6. In most cases, in order to render the admixture substantially homogenous, it is desirable to heat the linseed oil-nonionic surface active agent admixture to temperatures of about 140° F. with agitation for at least two hours, and thereafter continue agitation for an additional four hours during the cooling-off period. Since the glycol constituent of my composition may consist of a mixture of glycols having different numbers of $-(OCH_2-CH_2)-$ substituents, the numerical value of X is herein intended to represent the average length of ethylene oxide chain. For example, my vehicle may contain tertiary octyl phenoxypolyethylene glycols, or mixtures of same, having the following formula:



wherein X=3, 5, 7, 8, or about 9 to 10.

The amount of surface active agents present in the vehicle is critical and must be kept at a minimum because it increases the cost of the finished vehicle and, more important, excessive amounts retard the drying of the paint and produce a soft film having poor durability or wear-resistance. Satisfactory vehicles may be produced with about 75%-90% by weight linseed oil and about 10%-25% by weight of the nonionic surface active

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agent, although I prefer the use of about 13-23% surface active agent and about 87-77% linseed oil.

I have found that when the nonionic surface active agent (e.g., octyl and nonyl phenoxyethylene glycols) contains a mixture of 5 and 6 ethyleneoxy substituents, less of the surface active agent is required to form a suitable dispersion with linseed oil than if the surface active agent contained a mixture of 9 and 10 ethyleneoxy substituents. On the other hand, as the ratio of non-ionic surface active agent to linseed oil is increased, the ability of the resulting paint film to dry will be lessened. For example, excellent tinting paste vehicles may be prepared with about 78% linseed oil and about 22% of a surface active agent having a mixture of 9 and 10 ethyleneoxy substituents, or with about 83-87% linseed oil and about 17-13% of a surface active agent having a mixture of 5 and 6 ethyleneoxy substituents.

An excellent tinting paste vehicle may be prepared by admixing 80 parts linseed oil and 20 parts of a tertiary octyl phenoxypolyethylene glycol comprising a mixture of glycols having either 9 and 10 or 5 and 6 $-(OCH_2-CH_2)-$ substituents. Similarly, a vehicle consisting of 85 parts linseed oil and 15 parts of tertiary octyl phenoxypolyethylene glycol containing a mixture of 5 and 6 ethyleneoxy substituents provides a good dispersion; however, if the tertiary octyl phenoxypolyethylene glycol contains a mixture of 9 and 10 ethyleneoxy substituents, a decidedly inferior dispersion will be produced. A mixture consisting of 70 parts linseed oil and 30 parts wetting agent produces a paint film which does not dry properly and is, thus, generally considered unsatisfactory.

The following formulations also form satisfactory tinting paste vehicles:

100 parts alkali refined linseed oil	
30 parts $C_8H_{17}-(CH_2)_x-(OCH_2-CH_2)_x-OH$	
and	
100 parts linseed oil	
15 parts $C_8H_{17}-(CH_2)_x-(OCH_2-CH_2)_x-OH$	

Excellent tinting paste vehicles were produced by mixing 100 parts of linseed oil with 13 parts of mixed tertiary octyl phenoxypolyethylene glycols in which the polyoxyethylene chains varied in the following ratios:

	PARTS BY WEIGHT				
	2	4	4	12	0
3 Polyoxyethylene chains	40	40	40	20	40
5 Polyoxyethylene chains	3	10	6	10	6
7 Polyoxyethylene chains	3	10	6	10	6

The particular pigment which is contained in a tinting paste has a decisive influence on the dispersibility of the tinting paste in aqueous paint systems. This influence is very obvious when polyvinyl acetate paints are used. However, the following pigments are easily dispersed in polyvinyl acetate paints and may be present in my tinting paste vehicle:

- Iron-red, -Yellow, -Black
- Chromium Yellow, Chromium Orange
- Chromium Oxide Green; Pigment Green B
- Ultramarine Blue
- Toluidine Red and other org. red pigments
- Phthalocyanine Green.

On the other hand, some pigments are not readily dispersed in polyvinyl acetate paints, probably because of their hydrophobic nature or because their abnormally high salt content has not been completely removed when the pigment was manufactured. For example, pigments such as Raw Umber, Burnt Umber, Phthalocyanine Blue

and Carbon Black are considerably more difficult to disperse in polyvinyl acetate paints.

Thus, care should be exercised in selecting the pigment constituent.

When pastes are ground and prepared with my vehicle, the paste to be ground should be kept rather heavy in body. My tinting paste vehicle has good wetting properties and pastes containing same, generally, adhere very well to the rollers, but in some cases the addition of a grinding aid considerably improves the efficiency of the roller mill. A laboratory-type 3-roller mill gives satisfactory fineness with my paste.

My tinting paste should have a reasonably high viscosity in order to obtain sufficient fineness and maximum grinding efficiency. Further reduction of the viscosity of the paste is essential, since the paste should have the following flow properties:

- (1) Gravity flow in tube filling machine without blocking the nozzle or splashing.
- (2) Easily removed from the tube without settling.
- (3) Dispersibility in the base paint.

Excellent results have been obtained when the viscosity is 100 to 120 Krebs units.

Various percentages of my vehicle were added to a standard, dry (5 hrs.) white alkyd enamel, and the drying properties of the blends determined. It was found that up to 5%, based on the total weight of the paint, of my vehicle may be added to the alkyd enamel without objectionable loss of dryness. For example, when 1% and 5% of my vehicle were added to the paint, the paint was tack-free after 5 and 24 hour periods, and after 72 hours, the film was hard. This amount of vehicle (i.e., up to 5%) is more than adequate to cover a color range from pastel to medium shades. When my vehicle is properly added to polyvinyl acetate paints, no loss of dryness is observed.

In order to illustrate the compatibility of my vehicle, three tinting pastes were formulated as follows:

Table I

	Paste No. 1, percent	Paste No. 2, percent	Paste No. 3, percent
Phthalo Blue.....	12.5	12.5	12.5
Extender.....	12.5	12.5	12.5
Universal vehicle of my (above- mentioned) formulation.....	75.0		
Vehicle No. 1.....		75.0	
Vehicle No. 2.....			75.0

Pastes Nos. 1-3 were then individually added at various concentrations to the various paint systems shown in Table II in order to determine their dispersibility in very light and medium shades. The resulting paints were pulled down on white gloss paper, using a 3-mil draw down bar, and examined for color development, streaks, flooding, etc. The compatibility of these paints is shown in Table II.

Table II

Type of Paint	0.5% Tinting Paste (based on weight of paint)			5.0% Tinting Paste (based on weight of paint)		
	1A	2A	3A	1B	2B	3B
Oil.....	C	C	C	C	C	C
Oleo Resinous.....	C	C	C	C	C	C
Alkyd.....	C	C	C	C	C	C
Nitrocellulose.....	C	C	SI	C	C	SI
Cell. Aceto But.....	C	C	C	C	C	C
Styrene-Alkyd.....	C	C	C	C	C	C
Chlorinated Rubber.....	C	C	C	C	C	C
Acrylic.....	C	C	I	C	C	I
Polyvinyl Acetate.....	C	I	I	C	I	I

Rating:

C = Compatible, full color developed.

SI = Slightly incompatible, pigment flooding.

I = Incompatible, no color developed, streaks.

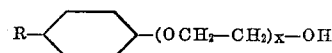
Table II shows that my tinting paste is completely compatible with organic as well as aqueous paint systems, whereas the vehicles used in Pastes 2 and 3 were incompatible with polyvinyl acetate paint systems. Paste 3 is also shown to be incompatible with the acrylic paint.

Thus, my universal tinting pastes containing my vehicle are particularly useful in paints which are commonly classified as "trade sales paints."

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

I claim:

1. A substantially homogeneous universal tinting paste vehicle consisting essentially of about 77-87% of linseed oil and about 23-13% of a nonionic surface active agent having the general formula:

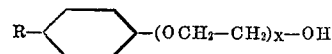


wherein R is a member of the group consisting of octyl and nonyl radicals, and X is at least 3 and not more than 10.

2. The substantially homogeneous paste vehicle of claim 1 wherein R is an isooctyl radical.

3. The substantially homogeneous paste vehicle of claim 1 wherein R is a nonyl radical.

4. A substantially homogeneous universal tinting paste vehicle consisting essentially of about 75-90% linseed oil and about 25-10% of a nonionic surface active agent having the general formula:

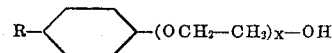


wherein R is a member of the group consisting of octyl and nonyl radicals, and X is at least 3 and not more than 10.

5. A substantially homogeneous universal tinting paste vehicle consisting essentially of about 75-90% linseed oil and about 25-10% t. octyl phenoxypolyethylene glycol.

6. A substantially homogeneous universal tinting paste vehicle consisting essentially of about 75-90% linseed oil and about 25-10% nonyl phenoxypolyethylene glycol.

7. A composition consisting essentially of a substantially homogeneous universal tinting paste consisting essentially of: (A) a vehicle consisting essentially of about 77-87% linseed oil, based on said vehicle, and about 13-23%, based on said vehicle, of a nonionic surface active agent having the general formula:



wherein R is a member of the group consisting of octyl and nonyl radicals, and X is at least 3 and not more than 10, and (B) a pigment substantially uniformly dispersed throughout said vehicle.

8. A substantially homogeneous universal tinting paste vehicle consisting essentially of about 80-85% of linseed oil and about 20-15% of tertiary octyl phenoxypolyethylene glycol.

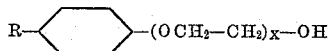
9. The substantially homogeneous universal tinting paste vehicle of claim 8 wherein the tertiary octyl phenoxypolyethylene glycol constituent consists essentially of a mixture of 5 and 6 ethyleneoxy substituents.

10. The substantially homogeneous universal tinting paste vehicle of claim 8 wherein the tertiary octyl phenoxypolyethylene glycol constituent consists essentially of a mixture of 9 and 10 ethyleneoxy substituents.

11. A composition consisting essentially of a substantially homogeneous universal tinting paste consisting essentially of: (A) a vehicle consisting essentially of about 75-90%, based on said vehicle, of linseed oil and about

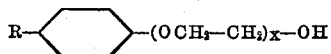
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25-10%, based on said vehicle, of a nonionic surface active agent having the general formula



wherein R is a member of the group consisting of octyl and nonyl radicals, and X is at least 3 and not more than 10, and (B) a pigment substantially uniformly dispersed throughout said vehicle.

12. The method of preparing a substantially homogeneous universal tinting paste vehicle comprising heating about 75-90% linseed oil and about 25-10% of a non-ionic surface active agent having the general formula:



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wherein R is a member of the group consisting of octyl and nonyl radicals, and X is at least 3 and not more than 10, at elevated temperatures of about 140° F. with agitation, and thereafter continuing agitation during the cooling-off period, thereby effecting the formation of a substantially homogeneous universal tinting paste vehicle.

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