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(54) QUICK DRYING SYNTHETIC RESIN COATING COMPOSITIONS

(71) We, NIPPON PAINT CO., LTD., a corporation organised under the laws of Japan, of 1-1, Oyodomachi-Kita-2-chome, Oyodo-ku, Osaka, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

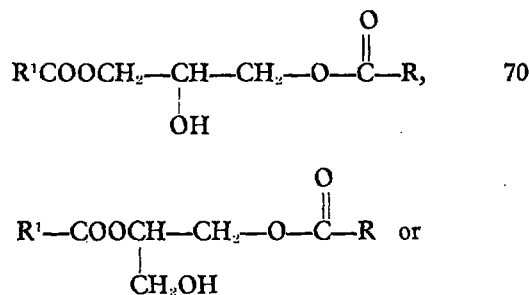
10 The present invention relates to a quick drying coating composition comprising a copolymer and an alkyd resin as the principal vehicle. A quick drying synthetic resin coating composition comprising as the principal vehicle a copolymer obtained by copolymerizing an acrylate, a methacrylate or styrene is usually called an acrylic resin paint or vinyl resin paint.

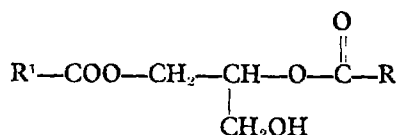
20 Though the dried films of these acrylic or vinyl resin paints have excellent durability, and gloss-holding properties the paints themselves can be difficult to use and often have poor spray workabilities and high build. These defects results from the facts that copolymers, one of the principal vehicle components, are typical high molecular weight materials and that the resin solids content of the paint composition is extremely low when diluted with a solvent to a viscosity suitable for spray-coating. Although these defects can be remedied considerably by reducing the molecular weight of the copolymer, other properties of the films obtained, such as durability, weather-resistance and crack-resistance, are impaired. Similarly, although the addition of plasticizers such as butyl benzyl phthalate or dibutyl phthalate to the copolymers improves considerably their spray workability at high build, the film obtained has a high temperature-sensitivity, and the weather-

resistance and gasoline-resistance thereof are often impaired. Methods of remedying these defects by addition of a condensation resin, particularly an alkyd resin, instead of the plasticizer, have not been generally employed in practice because the copolymer and a conventional alkyd resin are generally not compatible with each other.

It is known that the presence of a tertiary aliphatic hydrocarbon group in the copolymer employed in quick drying synthetic resin coating compositions has a large effect on weather-resistance and gloss. The present inventors have now succeeded in not only increasing the compatibility between the copolymer and an alkyd resin, but also in obtaining a quick drying coating composition excellent in weather-resistance and gloss by introducing a tertiary aliphatic hydrocarbon group into both the vehicle components.

In accordance with the present invention there is provided a quick drying synthetic resin coating composition comprising an organic solvent and a resin composition consisting of (A) 100 parts by weight of a copolymer of (1) 5 to 50% by weight of at least one polymerizable monomer represented by the formula:





wherein R stands for a monovalent tertiary aliphatic hydrocarbon group having in total 4 to 26 carbon atoms; R¹ stands for a mono-
 5 the formula COOR², wherein R² is a hydrocarbon group having 2 to 3 carbon atoms which may be substituted with one group of the formula COOR², wherein R² is a hydro-
 10 gen atom or an alkyl group having 1 to 4 carbon atoms, (2) 50 to 95% by weight of methyl methacrylate and (3) 0 to 45% by weight of at least one other monomer copolymerisable with said polymerisable mono-

mer (1); and (B) 5 to 100 parts by weight of an alkyd resin containing 10 to 60% by weight of units derived from a tertiary aliphatic carboxylic acid represented by the formula:

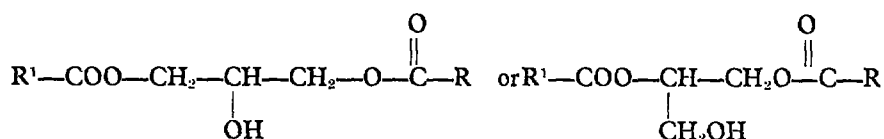
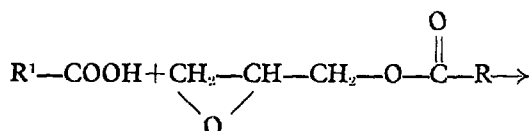


wherein R has the same meaning as defined above.

The monomer component (1) of the copolymer (A) may be prepared by the following two methods:

i) The addition reaction of the carboxyl group of an α,β -ethylenically unsaturated carboxylic acid with the epoxy group of a glycidyl ester of a tertiary aliphatic carboxylic acid.

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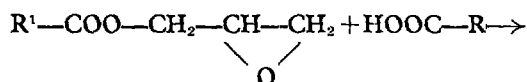


wherein R and R¹ have the same meanings as defined above.

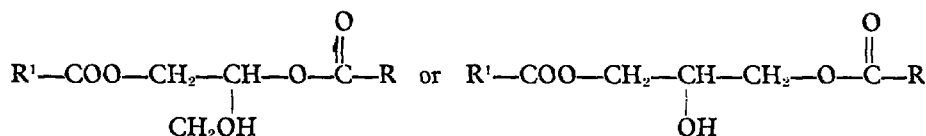
ii) The addition reaction of the epoxy group of a glycidyl ester of an α,β -ethylenically

unsaturated carboxylic acid with the carboxyl group of a tertiary aliphatic carboxylic acid.

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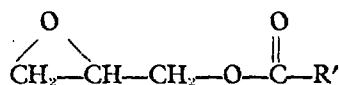


wherein both R and R¹ have the same meanings as defined above.

The aforesaid addition reactions may be carried out before, after or simultaneously with the copolymerization reaction. The addition reaction product may be used as produced or after isolation from the reaction mixture.

Examples of α,β -ethylenically unsaturated carboxylic acids employed for the addition reaction i) include unsaturated monocarboxylic acids having 3 or 4 carbon atoms such as acrylic acid, methacrylic acid, and crotonic acid; unsaturated dicarboxylic acids having 4 or 5 carbon atoms such as itaconic acid, maleic acid and fumaric acid; and monoesters of these unsaturated dicarboxylic acids with

alkanols having 1 to 4 carbon atoms. These compounds may be used alone or in combinations of two or more. An example of a suitable glycidyl ester of a tertiary aliphatic carboxylic acid is "Cardura E" (a trade mark of Shell Chemical Company for a mixture of compounds having the formula:



wherein R' is a monovalent saturated C₈ to C₁₁ tertiary aliphatic branched chain hydrocarbon radical).

Examples of glycidyl esters of α,β -ethyl-

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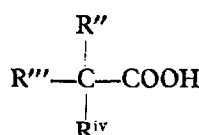
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enically unsaturated carboxylic acids employed for the addition reaction ii) include glycidyl acrylate, glycidyl methacrylate, glycidyl crotonate, monoglycidyl itaconate, monoglycidyl maleate, monoglycidyl fumarate, glycidyl esters of monoalkyl (C_1-C_4) itaconate, glycidyl esters of monoalkyl (C_1-C_4) fumarate, and glycidyl esters of monoalkyl (C_1-C_4) maleate. These compounds may also be used alone or in combinations of two or more. Examples of a suitable tertiary aliphatic carboxylic acid are "Versatic Acid 911" (a trade mark of Shell Chemical Company for a mixture of compounds having the formula,



wherein R'' , R''' and R^{iv} are monovalent aliphatic groups having 8 to 10 carbon atoms in total), neopentanoic acid, neoheptanoic acid, neodecanoic acid and neotridecanoic acid. These acids may be used alone or in combinations of two or more.

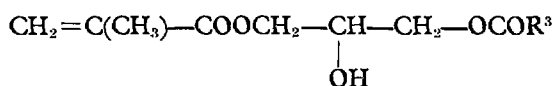
The addition reactions i) and ii) proceed smoothly without side reactions at temperatures of from 80° to 180°C , preferably from 140° to 170°C . In the addition reaction, a Lewis base catalyst, such as a tertiary amine, may be employed if desired.

The proportion of the monomer component (1) in the copolymer (A) ranges from 5 to 50% by weight and below this range it cannot impart to the copolymer (A) a sufficient compatibility with the alkyd resin (B). A

particularly preferred proportion is from 6 to 40% by weight.

The copolymer (A) contains from 50 to 95% by weight of methyl methacrylate. If desired, up to 45% by weight of another copolymerisable monomer (3) can be included in the copolymer.

Examples of the copolymerisable monomer (3) in the copolymer (A) are olefinically unsaturated monomers having 2 to 30 carbon atoms, including esters (other than methyl methacrylate) of acrylic acid or methacrylic acid with alkanols having 1 to 16 carbon atoms, for example, methyl, ethyl, propyl or butyl acrylates, ethyl, propyl and butyl methacrylates; vinyl esters of saturated fatty acids such as vinyl acetate, and vinyl propionate; mono- and di-olefinic hydrocarbons such as styrene, vinyl toluene, α -methylstyrene, ethylene, and butadiene; unsaturated amides such as acrylamide, and methacrylamide; unsaturated nitriles such as acrylonitrile, and methacrylonitrile; methylolated unsaturated amides such as N-methylol acrylamide, and N-methylol methacrylamide; alkylethers of methylolated unsaturated amides such as N-methylol methacrylamide alkyl ethers and N-methylol acrylamide alkyl ethers; hydroxyalkyl acrylates or methacrylates such as hydroxymethyl acrylate, hydroxy ethyl acrylate, hydroxypropyl acrylate, hydroxyethyl methacrylate and hydroxybutyl methacrylate; polymerizable monomers having a non-drying oil fatty acid residue, a semi-drying oil fatty acid residue or a drying oil fatty acid residue, for example, addition reaction products represented by the formula:



wherein R^3 stands for a non-drying, semi-drying or drying oil fatty acid residue e.g., coconut oil fatty acid residue, castor oil fatty acid residue, peanut oil fatty acid residue, rice bran oil fatty acid residue, cotton-seed oil fatty acid residue, soybean oil fatty acid residue, sunflower oil fatty acid residue, tung oil fatty acid residue, perilla oil fatty acid residue, linseed oil fatty acid residue, and hempseed oil fatty acid residue.

For the preparation of the copolymer (A) a conventional method of polymerization can be employed. The polymerization reaction is preferably carried out in a solvent at a temperature of from 70° to 160°C in the presence of a polymerization initiator such as a peroxide or an azo compound.

The above mentioned alkyd resin, the (B) component, may be prepared by reacting either a tertiary aliphatic carboxylic acid of

the formula RCOOH (wherein R is as defined previously) or a glycidyl ester thereof with a polybasic acid having from 3 to 30 carbon atoms (or the anhydride thereof), and with a polyhydric alcohol having from 2 to 30 carbon atoms and, optionally a vegetable oil or a fatty acid, by a conventional method for the preparation of an alkyd resin (cf. T. C. Patton, "Alkyd Resin Technology, Formulating Techniques and Allied Calculations", Interscience Publishers, 1962 New York). Examples of suitable polybasic acids are phthalic acid, phthalic anhydride, isophthalic acid, terephthalic acid, tetrahydrophthalic acid, tetrahydrophthalic anhydride, trimellitic acid, trimellitic anhydride, maleic acid, maleic anhydride, fumaric acid, succinic acid, adipic acid and sebacic acid. Examples of suitable polyhydric alcohols include ethylene glycol, propylene glycol, diethylene glycol,

trimethylol propane, pentaerythritol, and neopentyl glycol, glycerin, trimethylol ethane, sorbitol. Each of the reactants may be employed alone or in combinations of two or more. Examples of suitable vegetable oils are tung oil, tall oil, linseed oil, dehydrated castor oil, soybean oil, cottonseed oil, olive oil, castor oil and coconut oil and fatty acids derived therefrom, and these compounds can also be used alone or in combinations of two or more.

The compatibility of the aforesaid copolymer with said alkyd resin depends upon the polybasic acids and polyhydric alcohols employed in the alkyd resin, and it is greatly improved when said alkyd resin contains from 10 to 60% by weight of the tertiary aliphatic carboxylic acid component. This is perhaps due to a high chemical affinity between the pendent tertiary aliphatic hydrocarbon group in the copolymer and the tertiary aliphatic hydrocarbon group in the alkyd resin.

The proportion of the copolymer (A) to the alkyd resin (B) may be varied in the range of 100:5 to 100:100 parts by weight depending upon the performance required of the coating in use.

Examples of organic solvents and diluents which are useful in the preparation of the copolymer and alkyd resin or the quick drying synthetic resin coating composition of the present invention or in the application thereof include aliphatic, cycloaliphatic and aromatic hydrocarbons, ethers, esters, ketones and alcohols and they may be employed either alone or in combinations of two or more. Ethyl acetate, butyl acetate, methyl ethyl ketone, methyl isobutyl ketone, toluene, xylene, ethylene glycol monoethyl ether acetate, and butanol are particularly useful.

The amount of the solvent used is preferably from 20 to 95% by weight based on the total weight of the composition.

Plasticizers and pigments conventionally employed in paints, and in additives added in the preparation of paints and in the application thereof, such as silicone resin or surface active agents, may be employed in conventional amounts.

The amount of pigments employed in the quick drying synthetic resin paint of the present invention varies largely depending upon the kind of pigments employed, and it is preferably from 1 to 280% by weight based upon the resin solids (i.e. the total weight of copolymer A and resin B).

The volume of solvents and diluents used for the application of the paint varies depending upon the coating method employed. However, the weight ratio of resin solids to solvents or diluents in the paint at the time of coating is preferably from 60:40 to 10:90.

In the quick drying synthetic resin coating compositions of the present invention,

cellulosic derivatives, such as nitrocellulose and cellulose acetate butyrate or other polymeric materials such as melamine-formaldehyde resins benzoguanamine-formaldehyde resins or urea-formaldehyde resins can be added if desired, in conventional quantities, that is to say, such that the ratio of the combined weight of the copolymer and alkyd resin to the weight of these cellulosic derivatives or amino resin solids is from 100:0 to 70:30. Metallic salt dryers such as cobalt, manganese, lead or zirconium salts may also be added in a conventional amount, if desired.

The quick drying synthetic resin coating composition of the present invention can be applied by any suitable technique to a substrate for example by spray-coating, brush-coating, immersion-coating or roller-coating. The film obtained from the present coating composition can be cured by allowing it to stand at room temperature and also by heating to a temperature below 300°C.

Suitable substrates to be coated with the quick drying synthetic resin coating composition of the present invention are metals, wood, rubber, glass, fibers, and a variety of plastics moldings.

The present invention is illustrated by the following examples, in which all parts are by weight unless otherwise specified.

Example 1.

1—a) (Preparation of component (1) of copolymer A).

"Cardura E"	875.00 parts
Methacrylic acid	344.00 parts
Xylene	305.00 parts
Hydroquinone	0.18 parts

The above reactants were charged into a reaction vessel and heated to 140°C with stirring. The addition reaction of the epoxy group in "Cardura E" with the carboxyl group of methacrylic acid was traced while quantitatively determining the remaining carboxyl group in the system.

The addition reaction was considerably exothermic and xylene was added to prevent sudden over-heating of the system. Hydroquinone was added to prevent polymerization at this reaction stage. The addition reaction was completed in about 40 minutes. Consequently, a polymerizable addition reaction product solution was obtained. This polymerizable addition reaction product may, of course, be isolated from the system and purified; however, in the present invention, there is no necessity of isolation and purification of the product and the xylene solution containing a total amount of 80% by weight of the addition reaction product obtained in said reaction and a trace amount of methacrylic acid remaining owing to the addition

- in a slight excess (the acid number of said solution being 18) was used as such.

1—b) Preparation of copolymer A.

5	Addition reaction product solution obtained in 1—a)	50.0 parts
	Methyl methacrylate	340.0 parts
	Lauryl methacrylate	20.0 parts
	Xylene	274.0 parts
	Toluene	160.0 parts

- 10 The above reactants were charged into a reaction vessel and refluxed with stirring. While maintaining the reflux, a polymerization initiator solution comprising 4 parts of azobisisobutyronitrile and 160.0 parts of ethyl acetate was added dropwise over a period of two hours. After the completion of the addition, the reaction mixture was heated under reflux for a further two hours with stirring. The thus obtained copolymer resin solution contained 40% of non-volatile matters and the viscosity thereof (P) was measured by means of a Gardner-Holdt viscometer.

1—c) Preparation of resin B

25	Phthalic anhydride	444.0 parts
	Glycerin	120.0 parts
	"Cardura E"	500.0 parts
	Xylene	80.0 parts

- 30 The above reactants were charged into a reaction vessel and heated to 240°C while refluxing xylene. An esterification reaction was carried out while removing water from the system in the form of an azeotropic mixture with xylene. Esterification was continued until the acid number reached 2, and subsequently the temperature was lowered to 120°C. Then 148.0 parts of phthalic anhydride and 250.0 parts of "Cardura E" were added thereto and the reaction was continued at 150°C until the acid number reached 7 and the reaction product was then diluted with xylene to obtain a resin solution containing 70% of non-volatile matters. The viscosity thereof (X) was measured by means of a Gardner-Holdt viscometer.

- 45 1—d) Preparation of coating composition
Copolymer resin solution contained in 1—b) 150.0 parts
Alkyd resin solution obtained in 1—c) 57.2 parts

- 50 The above ingredients were mixed together to obtain a paint.

Example 2.

2—a) Preparation of copolymer (A).

Addition reaction product solution obtained in Example 1—a)	100.0 parts	55
Methyl methacrylate	300.0 parts	
n-Butyl acrylate	20.0 parts	
Xylene	264.0 parts	
Toluene	160.0 parts	60

The above reactants were charged into a reaction vessel and the copolymerization reaction was carried out in the same manner as in Example 1—b) using an initiator solution comprising 4.0 parts of azobisisobutyronitrile and 160.0 parts of ethyl acetate. The resulting resin solution contained 40% of non-volatile matters and the viscosity thereof (U) was measured by means of a Gardner-Holdt viscometer.

2—b) Preparation of alkyd resin (B).

Phthalic anhydride	214.0 parts	
Adipic acid	61.0 parts	
Glycerin	96.0 parts	75
Fatty acid of dehydrated castor oil	337.0 parts	
"Cardura E"	240.0 parts	
Xylene	57.0 parts	

80 These reactants were charged into a reaction vessel and an esterification reaction was carried out at a temperature of from 200 to 240°C while refluxing the xylene. The condensed water was removed out of the system in the form of an azeotropic mixture with xylene. The reaction was continued until the acid number reached 4 when the reaction mixture was cooled and 250 parts of xylene were added thereto to yield a resin solution having 75% non-volatile matter and the viscosity thereof (X) was measured by means of a Gardner-Holdt viscometer.

2—c) Preparation of coating composition.

Copolymer resin solution obtained in 2—a)	160.0 parts	95
Alkyd resin solution obtained in 2—b)	21.4 parts	
Rutile type titanium oxide "R-820"	64.0 parts	100

These components were mixed and dispersed to give a paint.

Example 3.

3—a) Preparation of copolymer A.
Solution of the addition re-
action product obtained in

5	Example 1—a)	150.0 parts
	Methyl methacrylate	280.0 parts
	Xylene	250.0 parts
	Toluene	160.0 parts

10 These reactants were charged into a re-
action vessel and a copolymerization reaction
was carried out in the same manner as in
Example 1—b) using an initiator solution
comprising 4.0 parts of azobisisobutyronitrile
and 160.0 parts of ethyl acetate. The resulting
15 resin solution contained 40% of non-volatile
matter and the viscosity thereof (T) was
measured by means of a Gardner-Holdt visco-
meter.

3—b) Preparation of alkyd resin (B)

20	Neopentyl glycol	156.0 parts
	Trimellitic anhydride	288.0 parts
	Xylene	18.0 parts

25 These reactants were charged into a re-
action vessel and an esterification reaction
was carried out at a temperature of from
160° to 200°C until the acid number reached
20, while refluxing xylene and removing
water from the system, and subsequently the
temperature was lowered to 150°C. 375.0
30 parts of "Cardura E" were added thereto
and the reaction was continued at 150°C for
an additional 30 minutes and the reaction
product was diluted with xylene to give a resin
solution containing 55% of non-volatile
35 matter and the viscosity thereof (X) was
measured by means of a Gardner-Holdt visco-
meter.

3—c) Preparation of coating composition.

40	Copolymer resin solution ob- tained in 3—a)	135.0 parts
	Alkyd resin solution obtained in 3—b)	10.9 parts
	Butyl benzyl phthalate	18.0 parts
45	Aluminium pigment "Al- paste 1109MA"	3.3 parts
	Colored pigment "Microlith 4G Blue"	2.5 parts

These ingredients were mixed and dis-
persed to give a paint.

50

Example 4.

4—a) Preparation of copolymer (A)
Addition reaction product solu-
tion obtained in Example
1—a)

55	Methyl methacrylate	200.0 parts
	Xylene	240.0 parts
	Toluene	244.0 parts
		160.0 parts

These reactants were charged into a reaction
vessel and a polymerization reaction was car-
ried out in the same manner as in Example 1—b) using an initiator solution comprising
4.0 parts of azobisisobutyronitrile and 160.0
parts of ethyl acetate. The resulting resin
solution had a non-volatile matter content
of 40% and its viscosity (T) was measured
65 by means of a Gardner-Holdt viscometer.

4—b) Preparation of alkyd resin (B)

	Phthalic anhydride	74.0 parts
	Glycerin	91.0 parts
	Fatty acid of dehydrated castor oil	200.0 parts
	Xylene	27.0 parts

These reactants were charged into a re-
action vessel and an esterification reaction
was carried out at 240°C while refluxing
xylene until the acid number reached 1.2.
The reaction mixture was cooled to 100°C
and after adding 222.0 parts of phthalic
anhydride and 376.0 parts of "Cardura E"
the esterification reaction was further con-
tinued at 250°C until the acid number
reached 7. The reaction mixture was cooled
and diluted with xylene so that the non-
volatile matter content was 75%. The vis-
cosity thereof (U) was measured by means
85 of a Gardner-Holdt viscometer.

4—c) Preparation of coating composition.

	Copolymer resin solution ob- tained in 10—a)	140.0 parts
	Alkyd resin solution obtained in 10—b)	32.0 parts
	Rutile type titanium oxide "R-820"	64.0 parts

These ingredients were mixed and dis-
persed to give a paint. 95

Example 5.

5—a) Preparation of copolymer (A)
Addition reaction product solu-
tion obtained in Example
1—a)

		13 parts
	Styrene	20 parts
	Methyl methacrylate	65 parts
	n-Butyl acrylate	5 parts
	Toluene	67 parts

These reactants were charged into a re-
action vessel, and a solution consisting of 1.2
parts of azobisisobutyronitrile and 30.0 parts
of butyl acetate was dropped therein over
a period of two hours. The resulting mixture
was subjected to polymerization in the same
manner as in Example 1—b) to obtain a co-
polymer. The content of non-volatile matters
in the resulting resin solution was 50%, and
the viscosity thereof (X) was measured by
means of Gardner-Holdt viscometer. 115

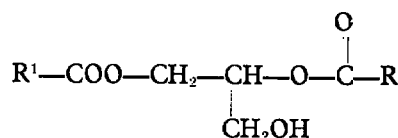
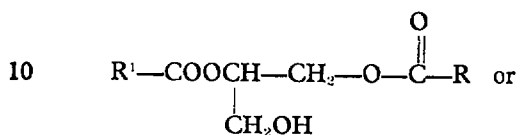
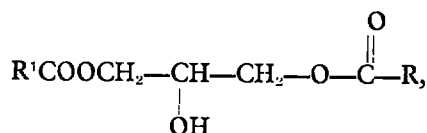
5—b) Preparation of alkyd resin (B)		perties of the coating films obtained from the paints prepared in Examples 1—d), 2—c), 3—c), 4—c), and 5—d).	40
	Phthalic anhydride 371 parts	The paints prepared in these Examples were diluted with a solvent comprising 15 parts of ethyl acetate, 45 parts of toluene, 20 parts of xylene, 10 parts of isobutanol and 10 parts of ethylene glycol monoethyl ether acetate until they had the viscosity of 15 to 25 seconds as measured with a Ford-cup No. 4 at 20°C. The composition was applied by an air-spray on to a steel panel having a thickness of 0.8 mm on which an epoxy-resin modified acrylic primer had been applied, and the coating was dried at room temperature for seven days. The thickness of the primer was about 40 microns and that of the quick drying synthetic resin paint was from 40 to 50 microns.	45
	Trimethylol ethane 209 parts		
	Coconut oil fatty acid 106 parts		
5	"Cardura E" 249 parts		
	Xylene 65 parts		
These components were charged into a reaction vessel, and the temperature was gradually raised to 240°C while blowing nitrogen gas into the mixture. Reaction was continued to an acid value of less than 10 while removing water of reaction in the form of an azeotropic mixture with xylene. The reaction product was cooled to 130°C, at which temperature xylene was added thereto to obtain a resin solution containing 50% of non-volatile matters and having a viscosity of H by means of a Gardner-Holdt viscometer.			
10			50
15			55
5—c) Preparation of cellulosic additive.			
20	Cellulose acetate butyrate 20 parts	The gloss of the resulting film was measured by means of a Murakami's gloss-meter at an angle of 60°. The surface hardness of the coated film was examined by a pencil scratching hardness. The impact strength was measured by a DuPont type impact tester on a stand having a diameter of $\frac{1}{2}$ inch using a weight of 500 g. The adhesiveness was measured by making 100 squares having 2 mm width on the coated film with a recording needle, sticking an adhesive tape thereon, and stripping off the tape forcibly. The test was considered as "passed" when none of the squares was stripped off. Water-resistance was tested by soaking the film in tap water at room temperature for 240 hours. Gasoline-resistance was determined by spotting a high octane gasoline on the coated film, evaporating the gasoline at room temperature and observing any normal condition of the film. The results of the above tests are shown in the Table.	60
	Methyl ethyl ketone 40 parts		
	Toluene 40 parts		
These ingredients were mixed to obtain a homogeneous solution.			
25	5—d) Preparation of coating composition.		
	Copolymer resin solution obtained in 5—a) 200 parts	As is apparent from the Table, the condition and workability of all the films were excellent.	80
	Alkyd resin solution obtained in 5—b) 100 parts		
30	Cellulose acetate butyrate obtained in 5—c) 160 parts		
	Aluminium pigment "Alpaste 1109MA" 6 parts		
35	Colored pigment "Microlith 4GT Blue" 4 parts		
These ingredients were mixed and dispersed to obtain a paint.			
The following is a description of the pro-			

TABLE

Paints Testings	Example 1—d)	Example 2—c)	Example 3—c)	Example 4—c)	Example 5—d)
Gloss	92	90	93	92	90
Pencil hardness	H	H	F	H	H
Impact strength (cm)	20	30	30	20	30
Adhesiveness	Passed	Passed	Passed	Passed	Passed
Water-resistance	Not abnormal	Not abnormal	Not abnormal	Not abnormal	Not abnormal
Gasoline-resistance	Not abnormal	Not abnormal	Not abnormal	Not abnormal	Not abnormal

WHAT WE CLAIM IS:—

1. A quick drying synthetic resin coating composition comprising an organic solvent and a resin composition consisting of (A) 100 parts by weight of a copolymer of (1) 5 to 50% by weight of at least one polymerizable monomer represented by the formula:



- wherein R stands for a monovalent tertiary aliphatic hydrocarbon group having in total 4 to 26 carbon atoms; R¹ stands for a monovalent α,β -ethylenically unsaturated hydrocarbon group having 2 to 3 carbon atoms which may be substituted with one group of the formula COOR², wherein R² is a hydrogen atom or an alkyl group having 1 to 4 carbon atoms, (2) 50 to 95% by weight of methyl methacrylate and (3) 0 to 45% by weight of at least one other monomer copolymerisable with said polymerisable monomer (1); and (B) 5 to 100 parts by weight of an alkyd resin containing 10 to 60% by

weight of units derived from a tertiary aliphatic carboxylic acid represented by the formula:

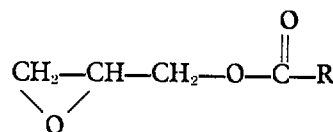


wherein R has the same meaning as defined above.

2. A composition according to Claim 1, wherein the monomer component (1) is an addition reaction product of an α,β -ethylenically unsaturated carboxylic acid represented by the formula:



wherein R¹ has the same meaning as in Claim 1 with a glycidyl ester of a tertiary aliphatic carboxylic acid represented by the formula:



wherein R has the same meaning as in Claim 1.

3. A composition according to Claim 2, wherein the α,β -ethylenically unsaturated carboxylic acid is an unsaturated monocarboxylic acid having 3 or 4 carbon atoms, an unsaturated dicarboxylic acid having 4 or 5 carbon atoms, or a monoester of said dicarboxylic acid with an alkanol having 1 to 4 carbon atoms.

4. A composition according to Claim 3, wherein the unsaturated monocarboxylic acid is acrylic acid, methacrylic acid or crotonic acid.

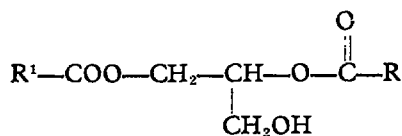
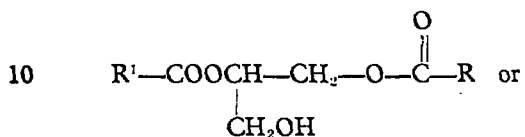
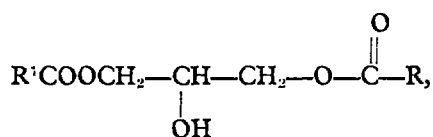


TABLE

Paints Testings	Example 1—d)	Example 2—c)	Example 3—c)	Example 4—c)	Example 5—d)
Gloss	92	90	93	92	90
Pencil hardness	H	H	F	H	H
Impact strength (cm)	20	30	30	20	30
Adhesiveness	Passed	Passed	Passed	Passed	Passed
Water-resistance	Not abnormal	Not abnormal	Not abnormal	Not abnormal	Not abnormal
Gasoline-resistance	Not abnormal	Not abnormal	Not abnormal	Not abnormal	Not abnormal

WHAT WE CLAIM IS:—

1. A quick drying synthetic resin coating composition comprising an organic solvent and a resin composition consisting of (A) 100 parts by weight of a copolymer of (1) 5 to 50% by weight of at least one polymerizable monomer represented by the formula:



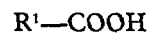
- wherein R stands for a monovalent tertiary aliphatic hydrocarbon group having in total 4 to 26 carbon atoms; R¹ stands for a monovalent α,β-ethylenically unsaturated hydrocarbon group having 2 to 3 carbon atoms which may be substituted with one group of the formula COOR², wherein R² is a hydrogen atom or an alkyl group having 1 to 4 carbon atoms, (2) 50 to 95% by weight of methyl methacrylate and (3) 0 to 45% by weight of at least one other monomer copolymerisable with said polymerisable monomer (1); and (B) 5 to 100 parts by weight of an alkyl resin containing 10 to 60% by

weight of units derived from a tertiary aliphatic carboxylic acid represented by the formula:

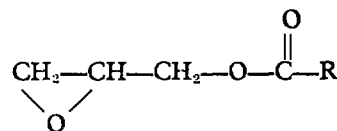


wherein R has the same meaning as defined above.

2. A composition according to Claim 1, wherein the monomer component (1) is an addition reaction product of an α,β-ethylenically unsaturated carboxylic acid represented by the formula:



wherein R¹ has the same meaning as in Claim 1 with a glycidyl ester of a tertiary aliphatic carboxylic acid represented by the formula:



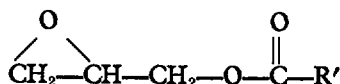
wherein R has the same meaning as in Claim 1.

3. A composition according to Claim 2, wherein the α,β-ethylenically unsaturated carboxylic acid is an unsaturated monocarboxylic acid having 3 or 4 carbon atoms, an unsaturated dicarboxylic acid having 4 or 5 carbon atoms, or a monoester of said dicarboxylic acid with an alkanol having 1 to 4 carbon atoms.

4. A composition according to Claim 3, wherein the unsaturated monocarboxylic acid is acrylic acid, methacrylic acid or crotonic acid.

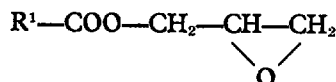
5. A composition according to Claim 3, wherein the unsaturated dicarboxylic acid is itaconic acid, maleic acid, or fumaric acid.

6. A composition according to any one of Claims 2 to 5, wherein the glycidyl ester of a tertiary aliphatic carboxylic acid is a mixture of compounds having the formula,



- wherein R' is a monovalent saturated C₈ to C₁₁ tertiary aliphatic branched chain hydrocarbon radical.

7. A composition according to Claim 1, wherein the monomer component (1) is an addition reaction product of a glycidyl ester of an α,β -ethylenically unsaturated carboxylic acid represented by the formula:



- wherein R¹ has the same meaning as in Claim 1, with a tertiary aliphatic carboxylic acid represented by the formula:

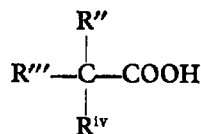


wherein R has the same meaning as in Claim 1.

8. A composition according to Claim 7, wherein the glycidyl ester of an α,β -ethylenically unsaturated carboxylic acid is glycidyl acrylate, glycidyl methacrylate, glycidyl crotonate, monoglycidyl itaconate, monoglycidyl maleate, or monoglycidyl fumarate.

9. A composition according to Claim 7 or Claim 8 wherein the tertiary aliphatic carb-

oxylic acid is neopentanoic acid, neoheptanoic acid, neodecanoic acid, neotridecanoic acid or a mixture of compounds having the formula,



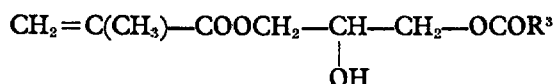
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wherein R'', R''' and R^{iv} are monovalent aliphatic groups having 8 to 10 carbon atoms in total.

10. A composition according to any one of Claims 1 to 9 wherein the monomer component (3) is an ester (other than methyl methacrylate) of an alkanol having 1 to 16 carbon atoms with acrylic acid or methacrylic acid; a vinyl ester of a saturated aliphatic carboxylic acid; a mono- or diolefinic hydrocarbon; an unsaturated nitrile; an unsaturated amide; a methylolated unsaturated amide; a methylolated unsaturated amide alkyl ether; or a hydroxy alkyl acrylate or methacrylate.

11. A composition according to Claim 10, wherein the monomer component (3) is methyl acrylate, ethyl acrylate, propyl acrylate, butyl acrylate, ethyl methacrylate, propyl methacrylate, butyl methacrylate, vinyl acetate, vinyl propionate, styrene, vinyl toluene, α -methylstyrene, ethylene, butadiene, acrylonitrile, methacrylonitrile, acrylamide, methacrylamide, N-methylol acrylamide, N-methylol methacrylamide, hydroxyethyl acrylate, hydroxypropyl acrylate, hydroxyethyl methacrylate or hydroxybutyl methacrylate.

12. A composition according to any one of Claims 1 to 11, wherein the monomer component (3) is a polymerizable monomer represented by the formula:



wherein R³ stands for a non-drying oil fatty acid residue, a semi-drying oil fatty acid residue, or a drying oil fatty acid residue.

13. A composition according to any one of Claims 1 to 12, wherein the component (B) is a reaction product of a tertiary aliphatic carboxylic acid represented by the formula:



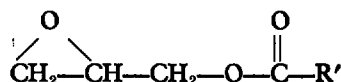
- wherein R has the same meaning as in Claim 1, or glycidyl ester thereof, with a polybasic acid having 3 to 30 carbon atoms or an anhydride thereof, and a polyhydric alcohol having 2 to 30 carbon atoms and, optionally, a vegetable oil or fatty acid.

14. A composition according to Claim 13, wherein the polybasic acid or anhydride is

phthalic anhydride, trimellitic anhydride, or adipic acid.

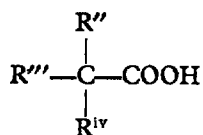
15. A composition according to Claim 13 or Claim 14, wherein the polyhydric alcohol is glycerin or neopentyl glycol.

16. A composition according to any one of Claims 13 to 15, wherein the tertiary aliphatic carboxylic acid or glycidyl ester thereof is a compound having the formula,



wherein R' is a monovalent saturated C₈ to C₁₁ tertiary aliphatic branched chain hydrocarbon radical, a mixture of compounds having the formula,





- wherein R'', R''' and R^{iv} are monovalent aliphatic groups having 8 to 10 carbon atoms in total, neopentanoic acid, neoheptanoic acid, neodecanoic acid or neotridecanoic acid.
17. A composition according to any one of Claims 13 to 16, wherein the fatty acid is soybean oil fatty acid, coconut oil fatty acid, castor oil fatty acid, or dehydrated castor oil fatty acid.
18. A composition according to any one of Claims 1 to 17, which further contains 1 to 280% by weight of pigment based upon the copolymer and alkyd resin solids.
19. A composition according to any one of Claims 1 to 18, which further contains up to 30% by weight of a cellulosic derivative, a melamine-formaldehyde resin, a benzoguanamine-formaldehyde resin, or a urea-formaldehyde resin based upon the total weight of the copolymer, alkyd resin and cellulosic derivative or amino-formaldehyde resin.

20. A composition according to Claim 19, wherein the cellulosic derivative is nitrocellulose or cellulose acetate butyrate.

21. A composition according to any one of Claims 1 to 20, wherein the organic solvent is ethyl acetate, butyl acetate, methyl ethyl ketone, methyl isobutyl ketone, toluene, xylene, ethylene glycol monoethyl ether acetate or butanol.

22. A composition according to any one of Claims 1 to 21, wherein the amount of the solvent is 20 to 95% by weight based on the total weight of the composition.

23. A quick drying synthetic resin coating composition substantially as hereinbefore described in any one of the Examples.

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