MONSANTO CHEMICALS

AROCLORS as Used in Pliolite S-5

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Monsanto Chemical Company, St. Louis 4, Mo.

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The AROCLORS,* chlorinated biphenyl and chlorinated polyphenyls, used as plasticizers and resins impart desired properties to Pliolite S-5 protective and decorative coatings prepared for:

Concrete Structures
Steel Structures
Railway Tank Cars
Concrete Floors and Walls
Wood and Metal Maritime Equipment

These fast drying paints provide excellent protection against acids and alkali, moisture and other commonly known corrosive influences. The formulations of Aroclors and Pliolite S-5 given in this bulletin are in line with good commercial practice and are suggested to the paint manufacturer as practical examples or starting points for preparing specific paints for use where the important qualities of Aroclor and Pliolite S-5 compositions are desired.

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AROCLORS As Used in Pliolite S-5 { Monsanto Tech. Bul. No. P-126, March 1, 1948

I. INTRODUCTION

The AROCLORS, chlorinated biphenyl and chlorinated polyphenyls, used as plasticizers and resins impart desired properties to Pliolite S-5, a co-polymer of butadiene and styrene developed by Goodyear Tire and Rubber Company, Inc.

Pliolite manufactured from natural rubber was used, prior to the last war, largely in paints and coatings requiring good resistance to moisture, acids, alkalies and other corrosive chemicals. During the war natural rubber was unavailable and Goodyear Research developed Pliolite S-5 which has even more outstanding characteristics as a paint base than natural rubber Pliolite.

II. PROPERTIES OF PLIOLITE S-5

The general and specific properties of Pliolite S-5 as given by Goodyear Tire and Rubber Company, Chemical Products Division, Akron, Ohio, are listed in the following Table I:

TABLE I. TYPICAL PROPERTIES OF PLIOLITE S-5

General Properties —		
	Forms	White resinous powder Light amber milled resin
	Color of solution	Very pale amber
	Color of film	Clear and colorless
	Odor	Absence of objectionable "paint" odor
Toxicity		Non-toxic
Chemical Resistance		Non-oxidizable, non-saponifiable, highly resistant to moisture, acids, alkalies, soaps and general corrosive influences. Highly resistant to alcohol, very resistant to vegetable, animal and mineral oils and greases.
General Physical Qualities		Thermoplastic, outstanding toughness and adhesion. High degree of flexibility with a minimum amount of plasticizer. Good thermal stability; withstands baking. Highly resistant to abrasion and scrubbing. Good aging characteristics; coatings do not oxidize and become brittle.
Specific Physical Qualities	Specific gravity	1.03
	Index of refraction	1.585
	Softening point	50°C.
	Tensile strength	1450 p.s.i.
	Elongation	0.0%
	Iodine number	57.8
	Acid value	Neutral

III. PIGMENTED PLIOLITE S-5 PAINT BASES

Pigments can be dispersed in Pliolite S-5 Milled Resin by plastic mixing on a differential speed two-roll mill or in an internal-type mixer such as the Banburg. For convenient use Goodyear offers the Pliolite S-5 pigmented bases given in the following Table II:

TABLE II. PLIOLITE S-5 BASES

Base No.	Percent Resin	Percent Pigment or Extender	Specific Gravity
S5 Resin	100%	None	1.03
1A-S5	35%	65% Titanium Dioxide, Rutile Type	2.02
2B-S5	60%	40% Carbon Black	1.27
5-S5	30%	70% Zinc Oxide	2.46
6-S5	20%	80% Red Lead	3.60
7C-S5	40%	60% Red Iron Oxide	2.06
8A-S5	40%	60% Zinc Chromate	1.84
12-S5	30%	70% Whiting, Precipitated	1.85
13-S5	40%	60% China Clay	1.66
14-S5	30%	70% Lithopone	2.25
15-S5	30%	70% Zinc Sulfide	2.20
17-S5	80%	20% Prussian Blue	1.17
19-S5	30%	70% Talc, Extra Fine	1.91
35-S5	80%	20% C. P. Toluidine Toner	1.13
38-S5	40%	60% Yellow Iron Oxide	1.92
39C-S5	40%	60% C. P. Chrome Green, Medium	1.89
41A-S5	35%	65% C. P. Chrome Yellow, Medium	2.30
46B-S5	50%	50% Lampblack	1.36
47-S5	30%	70% High Zinc Sulfide Lithopone	2.24
64-S5	25%	75% Molybdate Orange, Dark	2.79
65-S5	40%	60% C. P. Chrome Yellow, Extra Light	2.10
66-S5	70.5%	7.5% Phthalocyanine Blue	1.24
		22.0% Magnesium Carbonate	
68A-S5	40%	60% C. P. Chrome Green, Extra Light	2.02
80-S5	35%	65% Titanium Dioxide, Non-Yellowing, Rutile Type	2.02

IV. SUGGESTED SOLVENTS FOR AROCLORS AND PLIOLITE S-5 COMPOSITIONS

Aromatic hydrocarbons, or petroleum naphthas with high aromatic content, are the most satisfactory solvents for Aroclors and Pliolite S-5 coating compositions. Solutions of the compositions in these solvents tolerate dilution with inexpensive petroleum thinners up to about 50 percent by weight of the total solvent content.

These solutions are chemically neutral, stable and do not change in viscosity on aging nor do they react with pigments on long storage. The solution viscosity varies somewhat with the solvent used, but in general a 25 percent solution of the paint base in aromatic hydrocarbons has good brushing properties. If a lower solution viscosity is desired, this can be obtained by using the Pliolite milled resin which gives a viscosity of about one-third that of the resin powder.

Suggested solvents for Aroclors and Pliolite S-5 compositions are given in Table III.

TABLE III. SUGGESTED SOLVENTS FOR AROCLORS AND PLIOLITE S-5 COMPOSITIONS

LV — Low viscosity solution
MV — Medium viscosity solution
HV — High viscosity solution

Aromatic Hydrocarbons	Pliolite S-5 Concentrations 10%	20%
Benzene	LV	LV
Toluene	LV	LV
Xylene	LV	LV
High Flash Naphtha	LV	LV
High Aromatic Content Petroleum Solvents		
*[1] Apcosol 3A	LV	LV
*[1] Apco Iso 12	LV	LV
*[2] Solvesso No. 1	LV	MV
*[2] Solvesso No. 2	LV	MV
*[3] Solvent No. 2159	LV	LV
*[3] Solvent No. 2161	LV	LV
Chlorinated Hydrocarbons		
Carbon tetrachloride	LV	HV
Ethylene dichloride	LV	MV
Trichloroethylene	LV	HV
Perchloroethylene	MV	HV
Monochlorobenzene	LV	MV
Orthodichlorobenzene	MV	HV
Tetrachloroethane	LV	HV
Esters		
Amyl acetate	LV	LV
Butyl acetate	LV	LV
Ethyl acetate	LV	LV
*[4] Cellosolve acetate	LV	LV
Ketones		
Cyclohexanone	LV	MV
Methyl ethyl ketone	LV	LV
Methyl n-amyl ketone	LV	LV
Methyl iso-butyl ketone	LV	LV
Terpene Hydrocarbons		
Dipentene	LV	LV
Turpentine	LV	LV
Nitro Paraffins		
1-Nitropropane	LV	LV

*SUPPLIERS
[1] Anderson-Prichard Oil Corp.
[2] Standard Oil Co. of N. J.
[3] C. P. Hall Co.
[4] Carbide and Carbon Chemicals Corp.

In addition to the general information about solvents, Goodyear in their Technical Bulletin 509 present very comprehensive data concerning the selection of solvents and diluents for Pliolite S-5 paints. This is based on the observation that the Kauri-Butanol value has been found to be an excellent guide in choosing solvent mixtures for Pliolite S-5. In general, aromatic hydrocarbon solutions of Pliolite S-5 can be diluted with aliphatic hydrocarbons until the Kauri-Butanol value has been reduced to about 60. In the interest of economics, this serves as a guide in computing the maximum amount of aliphatic hydrocarbon of known K-B value that can be used with a given aromatic type solvent of known K-B value. Goodyear suggest that the K-B value of the solvent mixture be kept near the 60 value but stress the importance of the factor that during drying the solvent mixture should not become leaner in solvency than this initial value. This can be insured by choosing aliphatic and aromatic solvents possessing approximately the same boiling range. Due to their lower heat of vaporization, aliphatic hydrocarbons, when mixed with aromatic hydrocarbons of the same boiling range, always evaporate first and consequently such a solvent mixture will become progressively richer in solvent power upon drying.

Based on data taken from Circular 709 of the Scientific Section, National Paint, Varnish and Lacquer Association, Washington, D. C., and from bulletins of solvent suppliers, Goodyear in their Bulletin 509 classify a large number of solvents and diluents for Pliolite S-5 as being either very fast, medium or slow drying. This information is highly important particularly since Pliolite S-5 paints dry almost entirely in accordance with the rate of solvent release.

V. AROCLOR AND PLIOLITE S-5 PAINTS

PREPARATION OF THE PAINTS

Pliolite S-5 resin powder or the milled resin, as supplied by Goodyear, is dissolved in a selected solvent or solvent combination to serve as the paint vehicle. Aroclor plasticizers and Aroclor resins, as well as other desired additives, are then incorporated in the vehicle.

Pigments are then ground into these solutions by the conventional methods and the coatings are formulated in the usual manner. Goodyear emphasize that the solution viscosity of their milled Pliolite S-5 resin is approximately one-third that of the resin powder. Consequently the consistency of the finished paint can be varied over a considerable range according to the type of Pliolite resin used as well as by choice of plasticizers and pigments.

For convenience in formulating the coatings and because pigment dispersion in the Pliolite S-5 Paint Bases, prepared by plastic milling, is considerably better than can be obtained by wet grinding, the use of the plastic milled pigmented bases (described on page 3) is to be preferred in many formulations and particularly when preparing gloss finishes.

Using any of the procedures listed below to facilitate solution, it is standard practice to cut the Pliolite Bases in aromatic hydrocarbon solvents such as toluene, xylene or high flash naphtha for the initial solution. After this operation, petroleum solvents such as mineral spirits are used to make the final dilution of the paint.

1. Agitation by means of a stirring device, or tumbling in a drum or pebble mill until the resin has completely dissolved.

2. A more rapid method is to use simple agitation, as described above, until the material has softened. Then pass it through a stone mill or three-roll mill to complete the solution of the resin.

3. Using an internal-type mixer such as a Banbury, a sufficient amount of solvent to form a heavy paste is mixed with the Pliolite S-5 Bases. This mixture is then stirred until the batch is smooth. This operation is done in three to four hours by keeping the paste sufficiently stiff to develop a temperature of at least 150°F., due to frictional heat. Following this, the batch is diluted until it can be easily transferred to a mixing tank where the balance of the ingredients are added to complete the formulation.

SUGGESTED FORMULATIONS

The following general formulation is suggested as a flat vehicle which offers great latitude in the choice of solvents and will enable the paint manufacturer to formulate in accordance with his own ideas and requirements.

Flat Wall Paint Vehicle

Ingredients	Percent by Weight
Pliolite S-5, Milled Resin	20
Aroclor 5460, Resin	20
Aroclor 1254, Plasticizer	10
High Solvency Petroleum Naphtha	27.5
Mineral Spirits	22.5
Total	100.0

The properties of this vehicle are:

Specific Gravity	1.03
Weight per Gallon	8.59 lbs.
Solids Content	50%
Viscosity, No. 4 Ford Cup	196 seconds

This oil-free vehicle was developed for use in the manufacture of flat wall paints by conventional wet-grinding procedures.

The following flat white wall paint which uses the foregoing described flat vehicle possesses very good brushing and application characteristics:

Flat White Wall Paint

Ingredients	Pounds per 100 Gallons
Rutile Titanium Dioxide	168
Natural Whiting	561
Asbestine	107
Flat Vehicle (as described above)	336
High Solvency Petroleum Naphtha	99
Mineral Spirits	87
Total	1358

Properties of this flat white are:

Weight per Gallon	13 pounds (approx.)
Solids Content	73.93%
Consistency	Good for brushing

This paint does not contain animal or vegetable drying oils nor rosin. It is non-oxidizing, non-skinning, fast drying, odorless after the solvents have evaporated, non-yellowing, fume resistant, resistant to water and moisture vapor, resistant to soap and alkaline cleansers, resistant to mildew and possesses good aging characteristics.

Concrete Floor Enamels

The prime requisites for a satisfactory concrete floor enamel include alkali and water resistance, good adhesion, good resistance to abrasion and sufficient hardness to resist marring as well as grinding in of dirt and grit.

Although the following enamels are intended primarily for use on concrete floors, they are suggested for general use on concrete, brick and plaster wall surfaces.

Ingredients	Yellow	Orange
	Percent by Weight	
Pliolite S-5 Base 13	20.00	23.68
Pliolite S-5 Base 38	—	2.79
Pliolite S-5 Base 41A	25.00	16.71
Pliolite S-5 Base 64	—	4.18
Aroclor 1254	1.80	1.78
Drying Oil*	0.90	0.90
High Flash Aromatic Naphtha	26.15	25.00
Petroleum Thinner	26.15	25.00
Total	100.00	100.00

Ingredients	Chinese Red	Dark Blue
	Percent by Weight	
Pliolite S-5 Base	—	3.00
Pliolite S-5 Base 13	21.40	21.50
Pliolite S-5 Base 17	—	21.50
Pliolite S-5 Base 64	26.30	—
Aroclor 1254	1.54	2.65
Drying Oil*	0.76	1.35
High Flash Aromatic Naphtha	25.00	25.00
Petroleum Thinner	25.00	25.00
Total	100.00	100.00

Ingredients	Green	Light Gray
	Percent by Weight	
Pliolite S-5 Base 1	1.20	22.25
Pliolite S-5 Base 13	20.45	18.11
Pliolite S-5 Base 38	—	0.65
Pliolite S-5 Base 39	20.21	0.28
Pliolite Base 46	—	0.32
Pliolite Base 46B	0.12	—
Aroclor 1254	2.42	1.46
Drying Oil*	1.20	0.73
High Flash Aromatic Naphtha	27.20	28.10
Petroleum Thinner	27.20	28.10
Total	100.00	100.00

Ingredients	Brown	Black
	Percent by Weight	
Pliolite S-5 Base 7C	5.19	—
Pliolite S-5 Base 13	11.83	26.28
Pliolite S-5 Base 38	29.45	—
Pliolite S-5 Base 46B	0.11	15.76
Aroclor 1254	1.89	1.84
Drying Oil*	0.95	0.92
High Flash Aromatic Naphtha	25.29	27.60
Petroleum Thinner	25.29	27.60
Total	100.00	100.00

*Raw tung oil, perilla or pale grinding linseed oil.

Ingredients	Battleship Gray Percent by Weight	Silver Gray Percent by Weight
Pliolite S-5 Base 1A	22.50	23.940
Pliolite S-5 Base 7C	0.24	—
Pliolite S-5 Base 13	20.52	21.840
Pliolite S-5 Base 38	0.85	1.191
Pliolite S-5 Base 39C	—	0.029
Pliolite S-5 Base 46B	0.96	0.153
Aroclor 1254	1.69	1.770
Drying Oil*	0.84	0.885
High Flash Aromatic Naphtha	26.20	25.096
Petroleum Thinner	26.20	25.096
Total	100.00	100.000

The above concrete enamels represent only a few of the colors attainable in Pliolite S-5 Base paints. Paint manufacturers may have their own ideas for arriving at the colors desired and may wish to consult Goodyear for additional information about colors.

These paints are considered to have good ultraviolet light resistance and results of accelerated aging tests indicate that they have superior light resistance to competitive products such as oleoresinous concrete enamels.

Due to the shortage of titanium dioxide Goodyear have not been able to supply the demand for their Pliolite Base 1-S5. In an effort to relieve this situation, paint manufacturers able to obtain titanium dioxide can prepare concrete floor enamels by wet grinding the titanium dioxide with a three-roll mill or a pebble mill in accordance with the following formulations and procedures:

Battleship Gray Concrete Floor Enamel

(Three-roll or five-roll mill grind)

White Base	Percent by Weight
Pliolite S-5 Resin Solution[1]	26.32
Aroclor 1254	6.32
Drying Oil[2]	3.16
High Flash Aromatic Naphtha	2.10
Petroleum Thinner	2.10
Titanium Dioxide	60.00
Total	100.00

[1]Pliolite S-5 Resin 40%
High Flash Naphtha 30%
Petroleum Thinner 30%
Total 100%

[2]Raw tung, perilla or pale grinding linseed oil.

Run the above white base to a fine grind on a three-roll or five-roll mill. To prepare the finished enamel dissolve the Pliolite S-5 Bases given in the following formula in the given solvents. Then add the roll mill ground White Base and Aroclor plasticizer as given below:

Finished Enamel	Percent by Weight
White Base (Roll Mill Ground)	24.40
Pliolite S-5 Base 7C	0.24
Pliolite S-5 Base 13	20.52
Pliolite S-5 Base 38	0.85
Pliolite S-5 Base 46B	0.96
Pliolite S-5 Resin	5.30
Aroclor 1254	0.15
Drying Oil	0.08
High Flash Aromatic Naphtha	23.75
Petroleum Thinner	23.75
Total	100.00

If a pebble mill grind is to be made instead of a roll mill grind, then the following formulation and procedure should be used:

Battleship Gray Concrete Floor Enamel
(Pebble Mill Grind)

White Base	Percent by Weight
Pliolite S-5 Resin	13.52
Aroclor 1254	4.52
Drying Oil*	2.26
High Flash Aromatic Naphtha	20.30
Petroleum Thinner	20.30
Titanium Dioxide	39.10
Total	100.00

Run the above White Base to a fine grind in the pebble mill. To prepare the finished enamel dissolve the Pliolite S-5 Bases indicated in the following formula in the given solvents. Then add the pebble mill ground White Base and Aroclor plasticizer as given below:

Finished Enamel	Percent by Weight
White Base (Pebble Mill Ground)	37.39
Pliolite S-5 Base 7C	0.24
Pliolite S-5 Base 13	20.52
Pliolite S-5 Base 38	0.85
Pliolite S-5 Base 46B	0.96
Pliolite S-5 Resin	2.82
High Flash Aromatic Naphtha	18.61
Petroleum Thinner	18.61
Total	100.00

If desired, this enamel may be produced entirely in the pebble mill by first grinding the White Base to the required fineness and then adding the balance of the materials and continuing the grind to accomplish the final solution.

It is indicated by Goodyear that these latter procedures are applicable in preparing their following types of Pliolite paints:

S-102-100	White
S-102-200	Green
S-102-600	Olive Gray
S-102-603	Silver Gray
S-102-604	Light Gray
S-102-605	Battleship Gray
S-102-700	Blue

Prior to giving consideration to the use of these methods or modifications of them for other color enamels it is suggested that Goodyear should be consulted for more specific information about their suitability.

The following are typical examples of acid and alkali resistant coatings, fume resistant enamel and an aluminum paint vehicle:

Acid and Alkali Resistant Coating
Black

Ingredients	Percent by Weight
Pliolite S-5 Base 13	26.28
Pliolite S-5 Base 46B	15.76
Aroclor 1254	1.84
Drying Oil*	0.92
High Flash Aromatic Naphtha	27.60
Petroleum Thinner	27.60
Total	100.00

*Raw tung oil, perilla or pale grinding linseed oil.

Fume Resistant Enamel

Gloss White

Ingredients	Percent by Weight
Pliolite S-5 Base 1	55.66
Aroclor 1254	1.96
Drying Oil*	0.98
High Flash Aromatic Naphtha	20.70
Petroleum Thinner	20.70
Total	100.00

* Raw tung oil, perilla or pale grinding linseed oil.

Aluminum Vehicle

Ingredients	Percent by Weight
Pliolite S-5 Resin	15.0
Aroclor 5460	15.0
Xylol	70.0
Total	100.0

The specific properties of this vehicle are:

Specific Gravity	0.955
Weight per Gallon	7.95 lbs.
Solids Content	30.0%
Viscosity, No. 4 Ford Cup	22 seconds

To prepare an aluminum finish add No. 422 Alcoa aluminum powder, or equivalent, to the above vehicle in the proportion of 12 percent by weight or 0.95 pounds per gallon.

Goodyear indicate that this aluminum paint has very good stability and samples aged in the laboratory for more than two months showed no loss in leafing. If a more flexible finish is desired, liquid or plasticizer type Aroclors 1242 or 1254 should be used.

Pliolite Base 19 S-5 for Imparting Non-Sagging and Improved Brushability to Pliolite S-5 Enamels

Goodyear report that difficulties with sagging and brushability of Pliolite S-5 enamels and flat whites have been experienced by some paint firms. To overcome this, it is suggested that Steatite (a special grade of talc) be incorporated in Pliolite S-5 on a two-roll mill to give a base which can be used to prevent sagging and improve the brushability of Pliolite S-5 formulations. Goodyear offer this base, containing 70 percent of Steatite and 30 percent of Pliolite S-5 under their trade name Pliolite Base 19 S-5. Addition of this base to Pliolite S-5 formulations tends to prevent sagging, improve brushing, prevent hard settling, impart high thixotropic consistency in solution and effect gloss only slightly.

Description of Pliolite Base 19 S-5

Composition	30% Pliolite S-5 70% Steatite
Specific gravity	1.91
Gloss of film	Satin sheen
Color of film	Semi-transparent, milky

EFFECT OF PLIOLITE BASE 19 S-5 ON PLIOLITE S-5 ENAMELS

The following formulations illustrate the results obtained by incorporating Pliolite Base 19 S-5 in Pliolite S-5 enamels. For example, the following Formula No. 1 demonstrates the results obtained by the addition of an aged solution of Pliolite Base 19 S-5 to a Pliolite S-5 enamel.

Formula No. 1

To one gallon of Pliolite S-5 gloss white enamel containing:

Ingredients	Percent by Weight
Pliolite Base 1 S-5	55.66
Aroclor 1254	1.96
Drying Oil	0.98
High Flash Aromatic Naphtha	20.70
Petroleum Thinner	20.70
Total	100.00

Add 28 ounces of an aged solution of:

Ingredients	Percent by Weight
Pliolite Base 19 S-5	40.0
High Flash Aromatic Naphtha	30.0
Petroleum Thinner	30.0
Total	100.0

The following Formula No. 2 demonstrates the results obtained by dissolving the Pliolite 19 S-5 along with the other ingredients of the enamel.

Formula No. 2

Ingredients	Percent by Weight
Pliolite Base 1 S-5	45.05
Pliolite Base 19 S-5	7.00
Aroclor 1254	1.80
Drying Oil	0.90
High Flash Aromatic Naphtha	22.63
Petroleum Thinner	22.63
Total	100.00

Formula No. 3 (Control)

Formula No. 3 is identical with Formula No. 1 with the exception that the Pliolite Base 19 S-5 has been omitted. It serves as a control in the following comparative study in which the viscosity and consistency of the enamels are given.

Formula	No. 4 Ford Cup	Stormer	Solid Content
No. 1	275 sec.	47 sec.	55.9%
No. 2	208 sec.	40 sec.	54.7%
No. 3	118 sec.	27 sec.	58.6%

Stormer consistency is given in seconds per 100 revolutions of a forked rotor with a 200 g. weight.

Both Formulas No. 1 and No. 2 contain about 0.5 pounds of Steatite per gallon. Although their solids content is lower than that of Formula No. 3, their consistency is substantially higher. This illustrates that Pliolite Base 19 S-5 adds body to the enamel and in actual brushouts both Formulas No. 1 and No. 2 were much better in working qualities than Formula No. 3 and showed no evidence of sagging.

VI. DRYING RATE OF AROCLOR PLASTICIZED PLIOLITE S-5 FORMULATIONS

Many of the Aroclor plasticized Pliolite S-5 enamels dry tack free in less than one hour. However, in common with other paint materials these enamels require several days to reach maximum hardness. Since drying and the development of hardness, in the case of these paints, are due only to solvent removal, force drying at elevated temperatures to accelerate the rate of solvent removal increases drying to a marked degree.

The rate of drying, especially to the tack free condition, can be varied in accordance with the evaporation rate of selected solvents. The drying rate of the enamels increases with increased pigment and filler content.

Drying oils added to the enamels increase the time required to attain maximum hardness. The incorporation of Aroclor plasticizers tends to reduce the time required for maximum hardness to develop.

VII. PLASTICIZERS AND MODIFYING AGENTS IN ADDITION TO AROCLORS OF INTEREST IN PLIOLITE S-5 PAINTS

C — Clear film; complete compatibility
H — Hazy film
I — Cloudy film; incompatible

Material	Ratio to Pliolite Resin 5:100	10:100	25:100	50:100
Drying Oils				
[11] Drisoy "A"	sl. H	H	I	—
[11] Drisoy "B"	sl. H	H	I	—
[11] Kel X-L	sl. H	H	I	—
Linseed, high acid	C	C	H	I
Linseed, neutral	C	C	H	I
[11] Diamond K Linseed	H	I	—	—
Oiticica	C	H	H	I
Perilla	C	H	I	—
Soya, alkali refined	I	—	—	—
[7] Thermolized Tung	sl. H	H	I	—
Tung, raw	C	C	C	H
Chemical Plasticizers				
AROCLORS, chlorinated biphenyl and chlorinated polyphenyls (all grades)	C	C	C	C
Chlorinated paraffin	C	C	C	C
Diamyl naphthalene	C	C	C	C
Dibutyl phthalate	C	C	C	C
Dioctyl phthalate	C	C	C	C
[9] Hercolyn	C	C	C	C
[8] Kapsol	C	C	C	C
[8] Kronisol	C	C	C	C
[8] KP-23	C	C	C	C
[8] Methox	C	C	C	C
MONSANTO'S SANTICIZER B-16.	C	C	C	C
Tricresyl phosphate	C	C	C	C
Resins				
AROCLORS, chlorinated biphenyl and chlorinated polyphenyls (all grades)	C	C	C	C
[2] Cumar (all grades)	C	C	C	C
[10] Duraplex AL-210-L	H	H	I	—
[4] Durex No. 220	C	C	C	C
Ester gum	C	C	C	C
Limed rosin	C	C	H	H
[5] Pentalyn A	C	C	C	C
[5] Pentalyn G	C	C	C	sl. H
[5] Pentalyn M	sl. H	H	I	—
[5] Pentalyn X	C	C	I	—
Polystyrene	I	—	—	—
Rosin	C	C	C	C
[5] Staybelite Ester No. 10	C	C	C	C
[6] Zinar	C	C	I	—
[6] Zirex	C	C	C	C
Varnishes				
Linseed-Cumar, 12½ gal.	C	C	C	C
Linseed-Cumar, 25 gal.	C	C	I	—
Linseed-Amberol ST-137, 12½ gal.	C	C	I	—

Material	Ratio to Pliolite Resin 5:100	10:100	25:100	50:100
Miscellaneous				
Acrylic resins	I	—	—	—
Alkyd resins	Alkyd resins as a class are not compatible.			
Buna-N, synthetic rubber	I	—	—	—
Cellulose Nitrate	I	—	—	—
Coumarone-indene oils and resins	C	C	C	C
Gilsonite	I	—	—	—
[6]Gloss Oil N-Glo-5y	C	C	H	I
[10]Gloss Oil	C	C	C	H
GR-S, synthetic rubber	H	H	H	H
[1]Lecithin Yelkin TTS	H	I	—	—
Maleic resins	Maleic resins as a class are not compatible.			
Phenolic resins	Phenolic resins as a class are of limited compatibility.			
[9]Piccolastic B 100	C	C	C	C
Polyvinylchloride	I	—	—	—
Rosin Oil	C	C	C	C

SUPPLIERS

[1]American Lecithin Company, Inc.
[2]Barrett Division, Allied Chemical and Dye Corporation
[4]Durez Plastics and Chemicals, Inc.
[5]Hercules Powder Company
[6]Newport Industries, Inc.
[7]O'Brien Varnish Company
[8]Ohio-Apex, Inc.
[9]Pennsylvania Industrial Chemical Corp.
[10]The Resinous Products and Chemical Company
[11]Spencer Kellogg and Sons, Inc.

VIII. GENERAL

The principal applications for Pliolite S-5 paints plasticized with Aroclors are coatings for metal, concrete, brick and masonry surfaces requiring resistance to acids, alkalies, water and other corrosive influences. These enamels are suggested for use as concrete floor paints, architectural finishes, metal primers and finishes, oil and grease-resistant coatings, baking primers and enamels, corrosion-resistant coatings and ship bottom paints.

Aroclors have a pronounced plasticizing action on Pliolite S-5 (butadiene and styrene co-polymer) imparting flexibility to the paint coatings and increasing their life.

The formulations of Aroclors and Pliolite S-5 along with their suggested uses, as given in this report, are in line with good commercial practice. Much of the information given was obtained from other firms, particularly Goodyear Tire and Rubber Company, Chemical Products Division, Akron, Ohio. The data given is to serve as a guide or starting point in the development of formulations to expand taking advantage of the outstanding qualities of Aroclors as plasticizers and resins for Pliolite S-5 paints.

★ ★ ★ ★

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For further information about Aroclors as used in Pliolite S-5, write, wire or call the nearest Monsanto office.

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