Plasticizers

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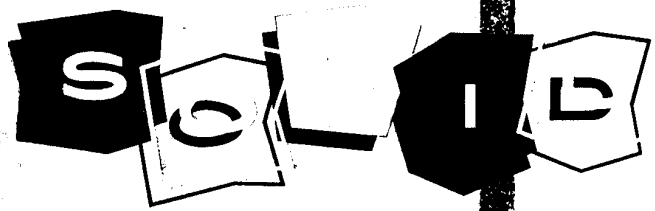

Monsanto

Monsanto Chemical Company
Plasticizer Sales Department
Organic Chemicals Division
St. Louis 24, Missouri

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TOWOLDMON0038690

TAKEN AS A CLASS

. . . solid plasticizers show more versatility than just about any other group. You find them in adhesives, lacquers, foams, rigid compositions and films . . . and in each type they perform unusual functions. Many times it is the solid plasticizer that allows a different product to be made, one that commands attention by its uniqueness.

This folder will acquaint you with the solid plasticizers available from Monsanto, and Monsanto can offer you the industry's largest selection. You'll find detailed information on each plasticizer in a Monsanto technical bulletin . . . see page 7 for the list. If you'd prefer, a Monsanto salesman will call and discuss your particular application. Investigate the new products or product improvements you can make by using solid plasticizers. Monsanto technical service will be glad to show you how solid plasticizers can work for you.

SOLID PLASTICIZERS GIVE YOU...

Hot processing

Hot processing is one area where solid plasticizers perform to good advantage. For instance, if you're mixing plasticizer and resin in a Banbury mixer, a solid plasticizer will melt at the processing temperature and function as a solvating liquid plasticizer for the resin. The lowered viscosity improves the formulation flow and results in much easier processing. Upon cooling, the plasticizer returns to its solid state which produces a stiff film or article.

Solvent use

In lacquers, certain solid plasticizers permit higher solid percentages. High-solid lacquers need fewer coats to build up a surface and therefore reduce application costs. As the lacquer dries, the presence of the solid plasticizer helps reduce blushing, sweating and separation.

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SOLID PLASTICIZERS GIVE YOU...

For adhesives...*unusual properties*

Delayed-tack and heat-seal adhesives owe their existence to solid plasticizers, because it is the solid plasticizer that makes delayed-tack and heat sealing possible. Delayed-tack adhesives are activated by heat, and once activated, remain tacky long enough to permit handling before the adhesive cools and sets. The sharp melting point of solid plasticizers provides a sharp activation point for the adhesive. This activation temperature varies with different solid plasticizers, and special adhesives can be easily formulated to fit handling methods by selecting the proper solid plasticizer. Delayed-tack adhesives are covered by U. S. Pat. Nos. 2,462,029; 2,608,542; 2,608,543; 2,613,156 and 2,613,191.

For films...*no blocking*

Solid plasticizers can be used with other primary plasticizers to produce tough, clear films that feel dry and separate easily. Liquid plasticizers used alone often cause blocking due to a slight surface tackiness. Solid plasticizers also add resilience to films and impart exceptional resistance to extraction by kerosene, oils and greases.

For rigid products...*easier processing*

Processing of rigid vinyl products can be made easier by using solid plasticizers . . . without changing present equipment or methods. With heating, the solid melts and acts as a solvating liquid plasticizer for the resin. Upon cooling, the article becomes rigid because the plasticizing effect of the solid plasticizer is slight at room temperature. Used strictly as a processing aid, the solid plasticizer pays its own way by lowering processing costs.

For heat-seal coatings...*sharp activation temperature*

Like adhesives, heat-seal coatings require the sharp melting points of solid plasticizers to give them the heat-seal property. By themselves, liquid plasticizers cannot endow coatings with a sharp activation temperature. Instead, the coatings tend to block and be tacky at temperatures beneath the activation temperature. In this type of coating, solid plasticizers can be chosen to provide an exact temperature at which the heat-seal property is activated. And beneath that critical temperature, the coating does not block or have tackiness.

For rigid foams...*toughness*

In the chemically-blown foams, solid plasticizers can be used to add toughness to the finished foam.

In the plastisol foam process, solid plasticizers thicken the starting formulation to make possible more uniform cell formation as the gas is released. A uniform cellular structure makes the foam tough and provides uniform dimensional stability.

In chemically-blown vinyl foams made by milling or Banburying, the solid plasticizer acts as a liquid solvating plasticizer at the process temperature to make possible easy processing. At room temperature, the solid plasticizer's inefficiency results in a higher compression-resistant foam.

For impregnants...*better flow*

To get even dispersement of impregnating powders, solid plasticizers can be used as a flow aid for producing brake band linings. The flow aid property is also useful in certain types of adhesives, phenolic moldings and thermosetting ureas.

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CHECK THIS LIST . . . . . .

of applications for Monsanto's solid plasticizers

Heat-sealing coatings
Dicyclohexyl phthalate (DCHP), Diphenyl phthalate, Santolite® MPH, Santicizer® 1-H, Santicizer 9

Rigid extrusions
Diphenyl phthalate, Aroclor® 5460, Triphenyl phosphate Santicizer 1-H, DCHP

Moldings and rigid foams
Triphenyl phosphate, Diphenyl phthalate, Aroclor 5460 and 1268, DCHP

Break-away "glass"
Santolite MHP

Phenolic brake linings
Santicizer 9

Surface coatings and composition wallboard

Cellulose acetate	Triphenyl phosphate
Nitrocellulose	DCHP, Diphenyl phthalate, Santolite MHP, Aroclor 5460
Melamine	Santicizer 9
Thermosetting resins	Santicizer 9, Santicizer 1-H, Triphenyl phosphate, Aroclor 5460 and 1268

Urea molding compounds
Santicizer 9

Fire-resistant cellulose acetate
Triphenyl phosphate

Crystallizing lacquers
Santicizer 1-H

Polyamides
Santicizer 9, Santicizer 1-H

Vinyl and other hot melts
Triphenyl phosphate, DCHP, Diphenyl phthalate, Aroclor 5460 and 1268, Montar® 4, 5, and 9

Delayed-tack adhesives
Diphenyl phthalate, Santicizer 1-H

Book-binding adhesives
Triphenyl phosphate, DCHP, Diphenyl phthalate, Aroclor 5460 and 1268, Santolite MHP, Santicizer 1-H

You can add to this list by developing your own special applications with solid plasticizers.

For special problems, take advantage of Monsanto's "Plasticizer Council" service. Research and technical service specialists are available to discuss and recommend ways to solve plasticizing problems.

Write: "Plasticizer Council"
Monsanto Chemical Company
Organic Chemicals Division
St. Louis 24, Missouri

Santolite, Santicizer, Aroclor, Montar: Monsanto Trademarks, Reg. U. S. Pat. Off.

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of Monsanto solid plasticizers

DICYCLOHEXYL PHTHALATE (DCHP)	Appearance	White Solid
	Acidity (phthalic acid)	0.01 per cent maximum
	Melting point	63° C. minimum
	Assay (ester content)	99 per cent minimum
	Color of melt (APHA)	100 maximum
	Odor	Moderately aromatic, slightly phthalic characteristic
	Moisture (KF in methanol)	0.1 per cent maximum
DIPHENYL PHTHALATE	Appearance	Essentially white, fused solid
	Color (APHA, diluted 20:50 ml. with acetone)	160 maximum
	Acidity (as phthalic acid)	0.20 per cent maximum
	Free phenol	0.20 per cent maximum
	Ash	0.05 per cent maximum
	Moisture	0.25 per cent maximum
TRIPHENYL PHOSPHATE	Appearance	White flakes
	Odor	Very faintly aromatic, maximum
	Melting point	48.5° C. minimum to start
	Acidity (as $H PO_2$)	0.003 per cent, maximum
	Stability to $KMnO_4$	65 per cent transmission, minimum
AROCLOR 5460	Appearance	Clear, yellow to amber brittle resin
	Color, NPA, Molten	2 maximum
	Softening Point, ° C. ASTM E28-51T	98 — 105.5
	Solubility (25 g. in 25 g. Acetone at 25° C.)	1 hour minimum
	Acid number, mg KOH/g.	.05 maximum
	Per cent chlorine	58.5 — 60.6
AROCLOR 1268	Hold Point ° C.	150 - 170
	Acid Number mg KOH/g.	.05

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MONTARS 3 and 4

Appearance	Black Solid	
Softening Point (Method ASTM E28-51T)	**MONTAR 3** 120 - 170 °C.	**MONTAR 4** 140 - 200 °C.
Acidity	Slightly basic	Slightly basic
Chlorine Content	50 - 52%	54 - 56%
CaO	5 - 10%	5 - 10%
Fe	0.3 - 0.6%	0.5 - 1.0%

MONTAR 5 / MONTAR 6 / MONTAR 9

	MONTAR 5	MONTAR 6	MONTAR 9
Softening Point, °C. (ASTM E28-51T)	180 - 250	150 - 210	130 - 160
Acidity (Mg KOH/g)	Slightly basic	Slightly basic	Slightly basic
Cl (%)	53 - 55	59 - 61	—
CaO (%)	1 - 3	2 - 5	—
Fe (%)	0.1 - 0.2	0.2 - 0.4	0.2 - 0.4
Flash Point (° F.)	—	—	450 - 550
Fire Point (° F.)	—	—	530 - 630

SANTOWAX R

Color, (Liquid), NPA	3.5 - 4.5
Upper Hold Point, °C.	137 - 145
Lower Hold Point, °C.	48 - 63
Distillation Range, °C. (Uncorrected)	80% from 350 - 400

SANTICIZER 1-H

Appearance	Yellowish brown fused mass
Crystallizing point °C. (in vacuum jacket)	82.5 min.
Melt test:	
Color (APHA)	300 max.
Clarity	S1. turbid max.
Moisture % (by KF in methanol)	0.25 max.

SANTICIZER 9

Appearance	Fine, white to light-cream, granular particles
Color & Turbidity (33⅓% by wt. in acetone)	
Turbidity	APHA 40 max
Color	APHA 85 max
Moisture (KF in methanol)	1.0% max.

SANTOLITE MHP "A" Grade

Appearance	Hard, practically colorless resin
Color of solution (25 grams in 75 grams butyl acetate)	APHA 50 max
Refractive index — 25° C. (25:75 butyl acetate)	1.4275 to 1.4320
Solubility (25:75 butyl acetate)	Complete

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TECHNICAL LITERATURE . . . . . .

...is available on all of Monsanto's solid plasticizers. Write for your copies today.

Triphenyl phosphate

Santicizer 1-H

Santicizer 9

Dicyclohexyl phthalate

Diphenyl phthalate

Santolite MHP, MS-80%

Santowax R

Montar Compounds

Aroclor Compounds

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Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents covering any material or its use.

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