Monsanto

File kit need [illegible]

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DATE : December 16, 1980

SUBJECT : XA-2045

REFERENCE :

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Under separate cover you will receive a kit containing a sample of XA-2045 and a rough draft of a data and property sheet. It is our intention to supply similar kits to field sales early in 1981 providing approvals are obtained from marketing (CNK), product acceptability (RWR), and patent (GRB).

XA-2045 is:	Santicizer® 160	40
	Santicizer 8	50
	Diacetone alcohol	7
	Scriptset 520	10
	Magnesium Carbonate	20

It is a hot melt pressure sensitive adhesive, a shock absorber, and makes an interesting sound when thrown against the wall. It will stick to most surfaces but can be removed easily. When tossed on a file cabinet it will "crawl" down the surface. (Caution: May leave an oil streak on glass, wallcovering, or fingers. Use the glove to handle.) Properties vary as concentrations are changed. Patents covering this type of composition are on file.

It is hoped that this kit could be a sales aid to interest customers in Santicizer 8 and Santicizer 160. We feel that this type of formula, with 60-70% of proprietary Monsanto material, is worth sending to the field but the main idea is to generate interest in highly plasticized maleic anhydride copolymer systems with the plasticizers being Monsanto benzyls and sulfonamides. We do not propose to sell adhesive compound.

We request that each person receiving the kit and the data sheet rough draft review the material and forward suggestions, comments, approvals, and vetos to the authors at Galt. Please call if we may answer any questions.

Thanks for your help.

A. W. Morgan

R. G. Ribaudo

/vw

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Enclosed please find:

1. One polyethylene glove
2. One bottle of "Splat," an adhesive mix with weird properties
3. One data sheet

As playing with this stuff has happily occupied the time of a whole bunch of folks who otherwise would be totally uninterested in the adhesive properties of Santicizer© 160, Santicizer 8 and Scriptset 520 we thought a similar experience might interest customers in these product. The sample in the bottle (XA-2045) is nicknamed "Splat" because it sounds like that when thrown against the wall. First, a caution. We don't recommend handling this material with bare fingers although no toxicity problems are anticipated. It can leave an oil trail on some surfaces so slinging it against glass or expensive wall covering is not a good idea.

To begin, put on the polyester glove. Open the bottle and work the sample out of the jar (use the gloved hand). Note the adhesion to varying surfaces. Toss it against a file cabinet. If done properly the material will slowly crawl down the cabinet into your hand. If you wish, toss it back on the cabinet a few times. Note the shock absorbing qualities.

Tear it, it will auto adhere. Heat it, it melts. It's soluble in MIBK, ethyl acetate, and other polar solvents and can be added to emulsions (with heat and a lot of shear).

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The formula is:

Santicizer® 160	40	
Santicizer 8	50	
Diacetone alcohol	7	
Scriptset 520	10	
Magnesium Carbonate	20	(added last to hot clear solution)

The materials must be added in the order named. (Any enolizing ketone can be used instead of acetyl acetone). Heat (105°C max) in a hood with stirring until clear (30-60 minutes). Add the carbonate with stirring and bottle. (Don't breathe the vapors. Observe caution, these materials can burn.)

So what is it good for?

(Anything with 70% plasticizer has got to be super good for lots of things.)

As is, it is a hot melt pressure sensitive adhesive with adjustable viscosity and strength (see data sheet).

By dropping the plasticizer to 50% by weight, lap shears of over 100 lbs. on masonite have been found. Because it demonstrates auto-adhesion it is a legitimate contact adhesive (hot melt or solvent based).

Other uses include:

- Shock absorbers (fill a plastic or rubber shell and it makes a dandy bumper. Maybe a use in dashboards or in drums used to protect drivers at off ramps.)
- Sound and vibrational dampening
- Bonding films
- Skid resistant surfaces
- Several ideas too indelicate to mention

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We're not really interested in toy or novelty applications but we are interested in about any other use that emerges.

Please drop us a line if more data is needed. If more samples or different properties are needed just give us a call.

AWM RGR

A. W. Morgan/R. G. Ribaudo

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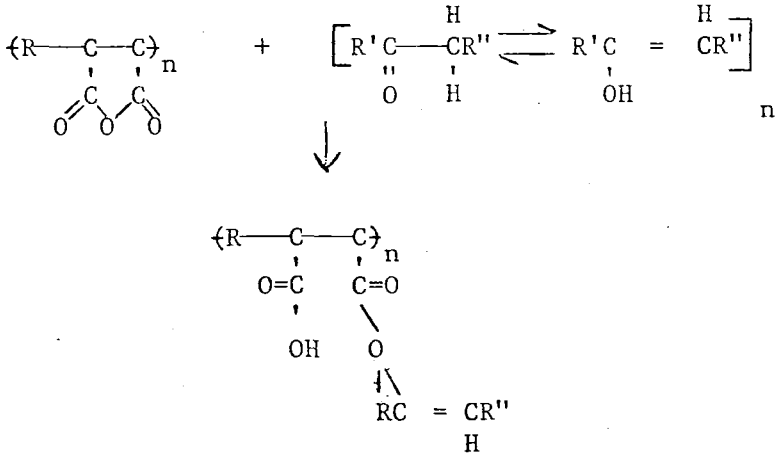
XA-2045-Type Materials

XA-2045-type adhesives are highly plasticized adhesive materials based on maleic anhydride copolymers. Viscosity, tack, adhesion, etc. can be adjusted by varying the concentration of plasticizer, resin, reactive plasticizer, or reactive solvent. This technology is covered under several patent applications and can be modified to produce viscous fluids, caulks, hot melt adhesives, hot melt pressure sensitive adhesives, and unique coatings.

TECHNOLOGY

Example:

Maleic anhydride copolymers (as Scriptset® 520) are added to a mix containing a benzyl phthalate, a sulfonamide, and a reactive solvent (such as an enolizable ketone). The solvent dissolves the anhydride resin as it reacts with the anhydride:



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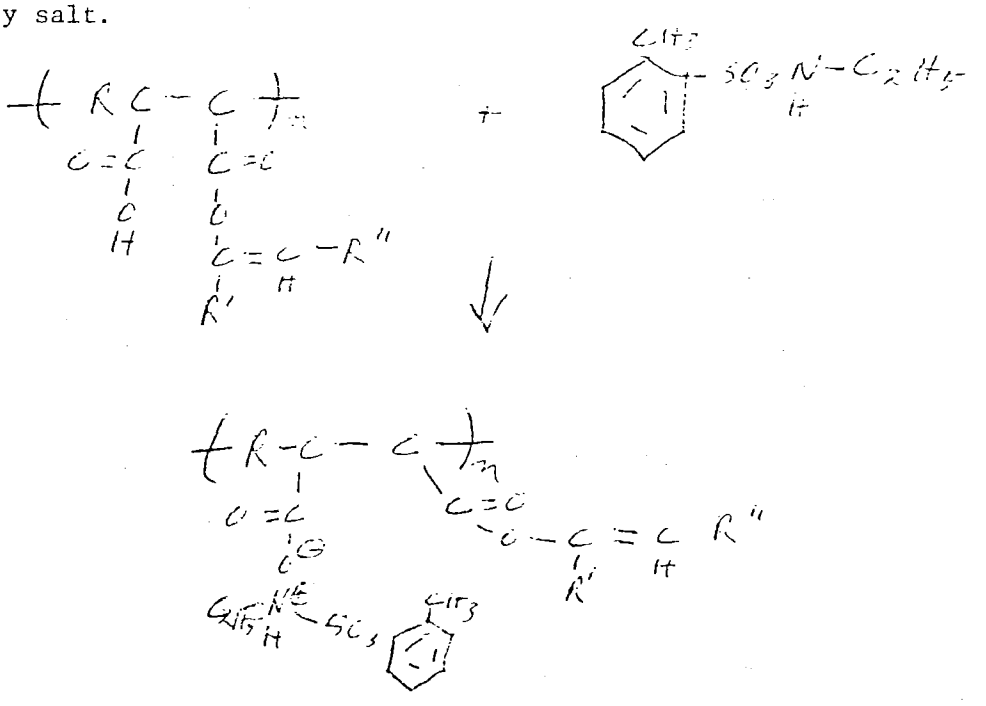
The sulfonamide can react with the free carboxylic acid to form a quatennary salt.



The benzyl phthalate (as Santicizer 160) and excess sulfonamide serves to plasticize and tackify the mix. Many other reactions are possible depending upon concentrations, conditions and reactants.

Table 1 describes samples prepared with enolizable compounds. Each sample was prepared by mixing the ingredients (in the order shown in Table 1) for 1 hour at 70°C. Samples 1-6 all gave good PSA systems with relatively long-lasting tack. All displayed auto-adhesion. Samples 7-9 were harder (effect of diacetone alcohol) but still showed auto-adhesion. Samples 10-12 were initially compatible but, because of the lower level of SMA resin (Scripset 520) did exude after 3 days. Nonetheless the samples initially show auto-adhesion and are capable of forming very strong bonds. When the most likely

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to exude sample (12) is filled (samples 13, 16) no exudation is seen, good caulk-like properties can be achieved (sample 14), rubbery thermoplastic caulks and sealants are found (samples 13, 15) and, strong, gel-like, shock absorbing properties are found (sample 16).

Table 2 demonstrates the thermostability of the systems. Acetyl acetone may be better than diacetone alcohol in thermal stability. The hardness measurements of Table 1 and Table 2 are predictable and expected for such highly "plasticized" systems. These aged samples were used to prepare the open time experiment in Table 3. This shows:

1. Stability as a hot melt.
2. No solvent effects (1 week at 70° will eliminate most stray ketone or ester that could be acting as a solvent).

In Table 3 a standard open time experiment was run. Masonite pieces (1" X 6" X 1/4" thick) were hand-coated (about 40 miles) with the samples listed. The coated section was about 1" X 2". The samples were allowed to lie exposed to air for 0, 1, 2, 3, 24, 48, 72, and 96 hours. Samples were laminated together (5Kg pressure, 5 min.) at the designated times and the bond strengths were measured (Instron, lbs. pull). Some variation was caused (* in Table 3) because the smooth surface of the Masonite peeled. In general, good open times of 2-3 hours were found and in two cases 24 to 32 pound shears were found after 72 hours. A simple reheating will regenerate the optimum surface and again give 100 plus lbs. bonds. The thermal stability and clarity of the acetyl acetone derived samples is most interesting.

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Table 4 answers the question of "will it work with only Santicizer® 160 or only Santicizer 8." The answer is "yes, but not as well as with a combination of the two." Santicizer 160 gives a 13.3 pound lap shear, Santicizer 8 gives a 73 pound lap shear, but the combination of the two gives a 100 plus pound lap shear.

Typically, these formulas may be sued as 100% solid hot melts, dissolved in solvent for coating (e.g., MEK, acetone, ethyl acetate, etc.) or emulsified. Caulk, sealant, coating, and adhesive applications are possible.

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TABLE 1

COMPONENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SANTICIZER 160	50	40	40	40	40	40	50	40	40	40	40	40	40	40	40	40
SANTICIZER 8	30	40	50	50	50	50	30	40	50	50	50	50	50	50	50	50
ACETYL ACETONE	20	20	20	20	14	7										
DIACETONE ALCOHOL							20	20	20	20	14	7	7	7	7	7
SCRIPTSET 520	40	40	40	30	20	10	40	40	40	30	20	10	10	10	10	10
DURAMITE													150			
TALC														50		
HYDRAL 710															50	
MAGCARB L																20
MAGNESIUM SULFATE																
HARDNESS (g)																
Graham-Linton																
1 day	0	0	0	0	0	0	0-50	0	0	0	0	0	0-50	0	0-50	0-50
7 days	0	0	0	0	0	0	50-100	0-25	0-50	-	-	-	0-50	0	50-100	100-125
THUMB APPEAL																
3 days	Slt.	Good	Excellent			Soft	0	Slt.	0		Exude		Good	Fair	E	Hard
4 days	Slt.	Good	(50 ft)			"	0	Slt.	0	-	-	-	Fair	"	L	"
7 days	0	Slt.	"	"	"	"	Hard	0	0	-	-	-	Fair	"	A	"
															S	
															T	
															O	
															M	
															E	
															R	

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TABLE 2

COMPONENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SANTICIZER® 160	50	40	40	40	40	40	50	40	40	40	40	40	40	40	40	40
SANTICIZER 8	30	40	50	50	50	50	30	40	50	50	50	50	50	50	50	50
ACETYL ACETONE	20	20	20	20	14	7										
DIACETONE ALCOHOL							20	20	20	20	14	7	7	7	7	7
SCRIPTSET 520	40	40	40	30	20	10	40	40	40	30	20	10	10	10	10	10
DURAMITE													150			
TALC														50		
HYDRAL 710															50	
MAGCARB L																20
MAGNESIUM SULFATE																
SHORE "A" HARDNESS																
1 day	-	-	-	-	-	-	8	1	2	3	2	-	2	-	2	4
1 week	-	-	-	-	-	-	16	7	5	-	-	-	5	-	7	10
STABILITY (70°C)																
1 week/color	Yel.	Yel.	Dk.Yel	Yel.	Yel.	Yel.	Brn.	Brn.	Brn.	Brn.	Brn.	Brn.	White	Grey	Tan	Tan
Pourable	Slt. Yes	Yes---------->				Water-like	Slt.	No	Yes---------->			Water-like	No	Slt.	No	No
Clarity	Yes---------->							Hazy---------->			Yes	Yes	Opaque---------->			

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TABLE 3

COMPONENTS	1	2	3	4	5	6	7	8	9	10	11	12
SANTICIZER® 160	50	40	40	40	40	40	50	40	40	40	40	40
SANTICIZER 8	30	40	50	50	50	50	30	40	50	50	50	50
ACETYL ACETONE	20	20	20	20	14	7						
DIACETONE ALCOHOL							20	20	20	20	14	7
SCRIPTSET 520	40	40	40	30	20	10	40	40	40	30	20	10
DURAMITE												
TALC												
HYDRAL 710												
MAGCARB L												
MAGNESIUM SULFATE												
LAP SHEAR (lbs./pull) 2" LAP ON 1" X 1/4" MASONITE												
HRS. COATED SAMPLE OPEN BEFORE BOND MADE/PSI --												
0	19.5	36	100*	21	30	6.6	81	100	89	100	64	18
1	12	21	14*	34	17	4	27	37	43	29*	17	18
2	12	14*	29	23	5*	4	18	20*	15*	33*	18	3
3	13	32	16*	19	20	3	-	27	21	16	-	6
24	3.5	4.6	-	-	2.1	.2	-	5.2	7	-	-	-
48	5.5	9	-	-	2.0	-	-	-	3	-	-	-
72	-	-	32	24	-	-	-	-	-	-	-	-
96	-	-	14	12	-	-	-	-	-	-	-	-

* = Substrate failure of Masonite (fiber tear) and/or coating variable

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TABLE 4

COMPONENTS	1	2	3
SANTICIZER® 160	40	90	-
SANTICIZER 8	50	-	90
CA-2020	-	-	-
ACETYL ACETONE	20	20	20
SCRIPTSET 520	40	40	40
SAMPLES PREPARED (1 Hour, 70°C)			
LAP SHEAR (lbs./pull) ON 1.4" MASONITE	100*	15.3	73

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