Monsanto

FROM (NAME & LOCATION): J. H. Orem - General Offices - B3NC

DATE : March 10, 1976

cc: [redacted]
J. M. VanGelder

SUBJECT : ADHESIVES MARKET
REQUEST FOR WORK

REFERENCE : 1. JHO memo 3-8-76, "Adhesives Market" plasticizer evaluations

TO : 2. JHO/BRD 3-10-76, "Adhesive Accounts"

J. A. Cannon
1730

This refers to the comparative evaluations done by P. W. May and my comment in the March 10th memo to Bruce Dolimount, "compared to Benzoflex 9-88 and 50, S-160 is more efficient, has a lower specific gravity and offers the formulator a chance to perhaps use less plasticizer and get the same adhesive properties....."

In Bill's work, Santicizer 160 (based upon 100% modulus) at the 5% level appears to be 20% more efficient than Benzoflex 9-88 and 14% more efficient than Benzoflex 50. Do you believe we could show equivalent open time, wet tack and water resistance by comparing:

4% Santicizer 160/96% Gelva S-55 VH,
5% Benzoflex 9-88/95% Gelva S-55 VH,
5% Benzoflex 50/95% Gelva S-55 VH?

Brookfield viscosities at 6, 12, and 30 rpm after 2 hours, 1 day and 7 days - as in the original work - should also be determined.

Joe, if you believe this efficiency approach may have merit, please proceed with the work.

I did not include the 10% plasticizer level because this is too high, based upon conversations with industry technicians. An upper level for testing would be 7.5% plasticizer/92.5% Gelva S-VH (14.7 phr plasticizer on 100% resin solids). If the outline efficiency work shows promise, we may want to look at this higher level and see if the 20% efficiency factor for Santicizer 160 is true.

J. H. Orem

JHO/gls

DSW 586785

STLCOPCB4092119

TS, Mod. Elng are 3 mil Films that were cast on Mylar

Monsanto

FROM (NAME & LOCATION) J. H. Orem - General Offices - B3NC

DATE : March 8, 1976

SUBJECT : ADHESIVES MARKET

REFERENCE : My memo 11-28-75

TO :
D. H. Bechtold - 1180
R. V. Johnson - 1130
A. L. Klemm - 1550
J. J. McNamara - 1650
E. C. Wilde - 1010
J. S. Williams - 1940
J. D. Wright - B2NC

cc:
J. A. Cannon - 1730
J. R. Darby - 1730
A. G. Eades
P. W. May - 1730
J. M. VanGelder
G. L. Wallace

Comparative evaluations of Santicizer 160, dibutyl phthalate, Benzoflex 9-88 and Benzoflex 50 in Gelva S-55VH have bee completed.

In general:

1. There is not a great deal of difference in wet tack, open time or water resistance,

2. At 5% plasticizer (about 9.5 phr on resin solids) and 95% Gelva S-55VH, there was little difference in viscosities after 2 hours and after 1 day; after 7 days with Santicizer 160, the viscosity of the plasticized emulsion was somewhat higher,

3. At 10% plasticizer (ca 19 phr), with Santicizer 160 the viscosities were all lower,

4. On physical properties of dried films, there was not much difference although dibutyl phthalate, in the 5% series, did yield a lower 100% modulus and higher elongation,

5. DOP was definitely inferior; poor compatibility, dried to a cloudy, brittle film, and therefore was eliminated from the study.

Tests

Wet Tack, in seconds: See Section 4 page 5 of the Blue Book.

Open Time, in seconds: See Section 4 page 5 of the Blue Book.

Water Resistance: A 6 mil wet film is applied to paper board; a second sheet is bonded to the first under 1 psi pressure. After conditioning at room temperature, the specimens, 1.5 X 2 inches, are suspended in water at 90°F with a 0.5 pound weight attached. The value reported is failure time in minutes.

DSW 586786

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EVALUATION RESULTS

Monsanto's Gelva S-55VH was plasticized with two levels of plasticizer, 5% and 10%. This is a 55% solids emulsion; the plasticizer level on a resin solids basis was 9.5 phr and 19 phr.

	DBP		S-160		Benzoflex 9-88		Benzoflex 50	
	5%	10%	5%	10%	5%	10%	5%	10%
Brookfield Viscosity* cps								
2 hours, 30 rpm	3240	-	3400	-	3220	-	3800	-
12 rpm	3550	4700	3650	3800	3250	4400	3800	4150
6 rpm	-	5100	-	4100	-	4600	-	4600
1 day, 30 rpm	2760	3880	2400	3480	2520	3560	2480	3040
12 rpm	2850	4120	2400	3600	2600	3700	2550	3150
6 rpm	3200	4500	2800	3900	2800	4100	2900	3400
7 days, 30 rpm	2880	3800	3620	2560	2920	3960	2680	3320
12 rpm	2900	3950	3700	2600	3050	4200	2750	3450
6 rpm	2900	4200	4200	2800	3400	4600	2900	3800
Water Resistance (minutes)	-	225	-	225	-	210	-	220
Wet Tack (seconds)	17	24	18	20	18	20	17	20
Open Time (seconds)	60	105	60	60	60	90	60	90
Physicals								
Tensile Str., psi	2130	800	2270	1330	2530	1200	2400	1200
100% Modulus, psi	1070	340	1870	530	2270	670	2130	530
Elongation, %	240	300	170	280	140	220	150	260

*Brookfield Model LVF, #3 spindle, measurements in cps @ 23°C.

DSW 586787

Per se plasticizer viscosities and Specific Gravities are:

	Gardner Bubble Viscosity at 24°C.	Sp. G. 25/25°C.
Santicizer 160	41 centistokes	1.119
Dibutyl phthalate	16 "	1.046
Benzoflex 9-88	85 "	1.129
Benzoflex 50	65 "	est. 1.153
Benzoflex 2-45	65 "	1.178

Benzoflex 9-88 is dipropylene glycol dibenzoate, Benzoflex 2-45 is diethylene glycol dibenzoate, and we understand Benzoflex 50 is a 1:1 blend of the two.

To further assist you in understanding Benzoflex 9-88 vis-a-vis Santicizer 160, I have attached the results of a recently completed screening in PVC. Note the comments on the transparency of the films plasticized with Benzoflex 9-88 after immersion in warm soapy water. There is a difference between the observation of "moderate severe" and "severe."

Please review the data with your salesmen and with your distributors. While there is not an overwhelming technical superiority for Santicizer 160, there is equivalence. We believe this is sufficient data to get your programs started. As individual customer situations are encountered that will require additional work, we will endeavor to do the specific work when you justify it via the Work Request.

J. H. Orem

JHO/gls
attach.

DSW 586788

STLCOPCB4092122

(Geon 102 EP=100, Plasticizer=67, Dibasic Lead Stearate=1)

	DOP	S-261	S-160	Benzoflex 9-88
Volatility, % plasticizer lost, 24 hrs. @ 87°C.	3.8	1.9	7.2	6.4
Low Temperature Flex T_f °C	-39.1	-26.9	-23.1	-11.9
Shore "A" Hardness	75	73	70	72
Kerosene Extraction % plasticizer lost	34.3	3.2	2.5	1.6
Water Sensitivity				
% Sol. Matter Lost	0.05	0.05	0.08	0.47
% Absorption	0.17	0.20	0.25	0.44
Soapy Water Performance				
1% "Ivory Snow" Powder				
% plas. lost (96 hrs. @ 50°C)	3.2	12.4	18.2	13.5
Transparency*	Slt.-Mod.	Mod.	Mod.-Severe	Severe
2% "Mr. Clean" liquid	2.3 (gain)	1.8 (gain)	0.8 (gain)	6.1
	Slt.-Mod.	Mod.	Mod.	Severe
2% "Ajax" dishwashing liquid	2.1	2.9	8.6	14.3
	Mod.	Mod.-Severe	Mod.-Severe	Severe
1% "Cascade" dishwashing powder	0.1 (gain)	0.2	1.2	7.7
	Slt.-Mod.	Mod.	Mod.-Severe	Severe
2% "Joy" dishwashing liquid	2.7	2.7	5.7	13.2
	Mod.	Mod.-Severe	Mod.-Severe	Severe

*Transparency (clousiness) was observed as samples were removed from the soapy water solutions and rated: Slt. = slight, Mod. - moderate, Sev. = severe.

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