Monsanto

FROM (NAME & LOCATION) A. W. Morgan - Galt 1730

DATE April 22, 1974

SUBJECT Mocan Foams

REFERENCE

cc: [redacted] Derby - 1730
M. W. Farrar R2E
R. E. Wexler E1SA

TO : L. O. Raether/John A. Cooper
B3NB

Attached are results of the fire tests for the eleven foams submitted by Mocan. Considerable analysis of the Data indicates that every urethane tested has severe decomposition problems (Endothermic around 400°K, exothermic around 550°K). Filler has a very slight stabilizing effect; fire retardant has a slight negative effect. Ester foams are the most thermally stable foams tested, but only by 15-20°K.

Gas analysis indicates that NCO occurs very early in decomposition with 22-52% weight loss occurring within five minutes at 258°C. All char analysis showed loss of nitrogen. All gas analysis trapped high nitrogen containing species. The conclusion that practical fire retardant methods for urethanes is greatly restricted by the extremely low decomposition point seems justified.

After you have had a chance to study this data perhaps we can discuss the best method of passing the information on to Bruce Murray.

Please hold this data confidential until we can determine its technical generality and implications.

A. W. Morgan

Att.
/vw

DSW 587601

	X-313	X-322	HR 2723	HR 2822	Ester 1055	Ester X-213	Cold Cure Molding	Neo-morphic Molding	Neo-morphic A	Neo-morphic B	year Moldin Cold Cure
Polyol											
%EO											
CP3800 12 5% Primary-OH	X	X							X	X	
CP4701 20 80% " "			X	X			X	X	X	X	
31-20 80% " "			X	X			X				
5% Acryloni-trile					X	X					
3365 Diethylene glycol Adipate											
100% Primary OH											
Filler Barytes Imcobar 104	115.0	115.0		40.4							15% (Ty not ide tified)
Fire Retardant											
2XC20						15.0					
T23P	6.0	10.0	2.5	2.5	0		0	1.5	0	1.5	?
FR2											
Stannous Octoate	X	X	X	X			X				
Amine	X	X	X	X	X	X	X	0	0	0	
Sodium Carbonate								X	X	X	
Silicone	X	X	0	X	0	0	X	X	X	X	
DOT											
Inches Burned	6.0/ 6.0	0.50/ 2.25	SENB	SENB	3.90/ 6.0	SENB	SENB	SENB	SENB	SENB	SENB
Inches Per Min./ Rate	2.36/ 2.32	0.94/ 1.11	"	"	3.77/ 3.33	"	"	"	"		"
SX	NO	YES	"	"	YES/NO	"	"	"	"	"	"

DSW 587602

STLCOPCB4092938

	X-313	X-322	HR 2723	HR 2822	Ester 1055	Ester X-213	Cold Cure Molding	Neo-morphic Molding	Neo-morphic A	Neo-morphic B	Molding Cold Cure
olyol											
%EO											
P3800 12 5% Primary-OH	X	X							X	X	
P4701 20 80% " "			X	X			X	X	X	X	
1-20 80% " "			X	X			X				
5% Acryloni-trile					X	X					
365 Diethylene glycol Adipate 100% Primary OH											
'iller Barytes	115.0	115.0		40.4	[redacted]						15% (Type not identified)
Imcobar 104											
'ire Retardant 2XC20						15.0					
T23P	6.0	10.0	2.5	2.5	0		0	1.5	0	1.5	?
FR2											
tannous Octoate	X	X	X	X			X				
mine	X	X	X	X	X	X	X	0	0	0	
odium Carbonate								X	X	X	
ilicone	X	X	0	X	0	0	X	X	X	X	
ASTM 1692											
Inches	5.0/	5.0/	SENB	5.0/	5.0/	1.80/	0.1/		5.0/	0.1/SENB	0.50/
Burned	5.0	5.0	SENB	5.0	5.0	1.55	SENB	SENB	5.0		0.10
Inches Per Min./	2.5/	2.05	SENB	2.4/	4.3/	3.0/	0.86/		3.5/	1.21/"	1.90/
Rate	2.6	2.11		2.5	4.1	2.8	SENB	SENB	3.3		1.20
SX	NO	NO	SENB	NO	NO	YES	YES/ SENB	SENB	NO	YES/ "	YES

DSW 587603

STLCOPCB4092939

	X-313	X-322	HR 2723	HR 2822	Ester 1055	Ester X-213	Mons. Cold Cure Molding	Neo-morphic Molding	Neo-morphic A	Neo-morphic B	[illegible] year Molding Cold Cure
olyol											
%EO											
P3600 12 5% Primary-OH	X	X							X	X	
P4701 20 80% " "			X	X			X	X	X	X	
1-20 80% " "			X	X			X				
5% Acryloni-trile					X	X					
365 Diethylene glycol Adipate											
100% Primary OH											
iller Barytes Imcobar 104	115.0	115.0		40.4							15% (Type) not identified)
ire Retardant											
2XC20						15.0					
T23P	6.0	10.0	2.5	2.5	0		0	1.5	0	1.5	?
FR2											
tannous Octoate	X	X	X	X			X				
mine	X	X	X	X	X	X	X	0	0	0	
odium Carbonate								X	X	X	
ilicone	X	X	0	X	0	0	X	X	X	X	
NBS Dm(Corr)Smoulder	154	160	126	158	87	111	144	135	186	73	184

DSW 587604

STLCOPCB4092940

	X-313	X-322	HR 2723	HR 2822	Ester 1055	Ester X-213	Mons. Cold Cure Molding	Neo-morphic Molding	Neo-morphic A	Neo-morphic B	Good year Molding Cold Cure
Polyol %EO											
CP3600 12 5% Primary-OH	X	X							X	X	
CP4701 20 80% " "			X	X			X	X	X	X	
11-20 80% " "			X	X			X				
5% Acrylonitrile					X	X					
2365 Diethylene glycol Adipate 100% Primary OH											
Filler Barytes Imcobar 104	115.0	115.0		40.4							15% (Type not identified)
Fire Retardant 2XC20						15.0					
T23P FR2	6.0	10.0	2.5	2.5	0		0	1.5	0	1.5	?
Stannous Octoate	X	X	X	X			X				
Amine	X	X	X	X	X	X	X	0	0	0	
Sodium Carbonate								X	X	X	
Silicone	X	X	0	X	0	0	X	X	X	X	
Wt. Loss (%)											
5 Min. at 214°C	4	6	4	4	3	6	3	4	6	6	3
258°C	25	29	25	33	22	25	36	28	25	27	52
279°C	47	49	71	64	31	34	76	53	62	63	46

DSW 587605

STLCOPCB4092941

	%EO		X-313	X-322	HR 2723	HR 2822	Ester 1055	Ester X-213	Mons. Cold Cure Molding	Neo-morphic Molding	Neo-morphic A	Neo-morphic B	year Molding Cold Cure
Polyol													
CP3800	12	5% Primary-OH	X	X							X	X	
CP4701	20	80% " "			X	X			X	X	X	X	
31-20		80% " "			X	X/			X				
		5% Acryloni-trile					X	X					
E365		Diethylene glycol Adipate 100% Primary OH											
Filler Barytes Imcobar 104			115.0	115.0		40.4							15% (Type not identified)
Fire Retardant 2XC20								15.0					
T23P FR2			6.0	10.0	2.5	2.5	0		0	1.5	0	1.5	?
Stannous Octoate			X	X	X	X			X				
Amine			X	X	X	X	X	X	X	0	0	0	
Sodium Carbonate										X	X	X	
Silicone			X	X	0	X	0	0	X	X	X	X	
DSC Endotherm °K			402-418	403-445	428-435	392-432	406-452	390-412	389-535	410-412	413-459	408-466	361-409
DSC Exotherm °K			560	533	544	550	579	555	535	539	523	539	538

DSW 587606

STLCOPCB4092942

258°C (5 min)(Wt %) & (%N)

Foam		Char	Room Temp. Acetone Soluble	Furnace Scrapings	-80°C	Smoke	% Wt Loss
#1 Monsanto Cold Cure 5.9% N	polyether polyol (slt carbonyl)	62% Char 5.0%N 1) Clear, hexane Sol. liq.	4% Wt 3.9% N Polyether Some N	15% Wt 14.4% N Aromatic N from TDI no ether	14% Wt 2.2% N Polyether Some N	Polyether Some N	3%
	Combination P.U. spectra like other fractions	2) Colored material partly soluble in CH_2Cl_2					
214°C (5 min.) 3-6% decomp.				High % N only fraction trapped			37%
258°C Foam 2X313 2.6% N		1.6% N (Char different)	5.2 N	-	2.8% N		33%
HR 2722 3.7% N		2.7% N	3.5% N	-	3.5% N		

DSW 587607

STLCOPCB4092943