MONOISOPROPYLBIPHENYL (MIPB)
& DIISOPROPYLBIPHENYL (DIPB)

Technical Data Sheet
May 1, 1958

RECEIVED
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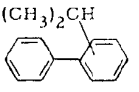
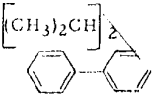
MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION
ST. LOUIS 24, MISSOURI

DEVELOPMENT DEPARTMENT
MONSANTO CHEMICAL COMPANY

TO ASSIST YOU IN THE EVALUATION OF THE ABOVE PRODUCT, WE HAVE OBTAINED THE INFORMATION CONTAINED IN THIS BULLETIN FROM LITERATURE SOURCES AND PRELIMINARY INVESTIGATION IN OUR OWN LABORATORIES. WHILE WE BELIEVE THE INFORMATION IS ACCURATE, WE ASSUME NO RESPONSIBILITY AND DISCLAIM ANY LIABILITY INCURRED IN USING THESE DATA OR SUGGESTIONS. ONLY QUALIFIED TECHNICAL PERSONNEL SHOULD WORK WITH THIS PRODUCT UNTIL SUBSEQUENT STUDIES JUSTIFY ITS USE IN YOUR PRODUCTS OR PROCESSES. OBVIOUSLY NOTHING IN THIS BULLETIN SHOULD BE CONSTRUED AS A RECOMMENDATION TO USE ANY PRODUCT IN CONFLICT WITH EXISTING PATENTS COVERING ANY MATERIAL OR ITS USE.

	MIPB	DIPB
Formula:		
Mol. Wt.	196.3	238 (Approx)
Appearance and Color	Water white liquid	Clear, slightly amber liquid
Approximate Assay	62% meta isomer 38% para isomer	Mixed isomers

PHYSICAL PROPERTIES

	MIPB	DIPB
Refractive Index, N_D^{25}	1.5798	1.563
Specific Gravity		
at 25°C. (77°F.)	0.979	0.953
at 100°C. (212°F.)	0.925	0.902
at 200°C. (392°F.)	0.857	0.840
at 300°C. (572°F.)	0.776	0.756
Pounds per Gallon at 77°F.	8.17	7.95

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TOWOLDMON0038472
WATER_PCB-00022941

	MIPB	DIPB
Specific Heat, (Cal/gm, °C. or BTU/lb, °F.)		
at 100°C. (212°F.)	0.470	0.482
at 200°C. (392°F.)	0.555	0.564
at 300°C. (572°F.)	0.637	0.646
	Cp = 0.37 + 0.00048t (t = °F.)	Cp = 0.386 + 0.000455t (t = °F.)
Viscosity (Centistokes)		
at -40°C. (-40°F.)	2616	--
at 38°C. (100°F.)	4.50	12.527
at 99°C. (210°F.)	1.42	2.360
at 200°C. (392°F.)	0.59	0.77
at 300°C. (572°F.)	0.31	0.36
Boiling Range (at 760 mm Hg)	295 - 300°C. (563 - 572°F.)	321 - 333°C. (610 - 631°F.)
Vapor Pressure (mm Hg)		
at 100°C. (212°F.)	-	-
at 150°C. (302°F.)	10	4
at 200°C. (392°F.)	63	28
at 250°C. (482°F.)	290	132
at 300°C. (572°F.)	950	450
at 350°C. (662°F.)	3.5 atm	1.7 atm
Flash Point	157°C. (315°F.)	171°C. (340°F.)
Fire Point	171°C. (340°F.)	185°C. (365°F.)
Pour Point	-57°C. (-70°F.)	-31°C. (-24°F.)
Thermal Conductivity (over temperature range of 100°C. - 220°C.)		
$Cal/(cm^2)(°C./cm)(sec)$	28.8×10^{-5}	28.1×10^{-5}
$BTU/(ft^2)(°F/ft)(hr)$	0.070	0.068

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TOWOLDMON0038473
WATER_PCB-00022942

NUCLEAR PROPERTIES

	MIPB	DIPB
N_H(atoms of Hydrogen/cc)		
at 100°C. (212°F.)	4.56×10^{22}	5.00×10^{22}
at 200°C. (392°F.)	4.21×10^{22}	4.63×10^{22}
at 300°C. (572°F.)	3.84×10^{22}	4.25×10^{22}

ELECTRICAL PROPERTIES

	MIPB	DIPB
Resistivity (ohm-cm)	1×10^{12} or greater 1×10^{14} or greater*	1×10^{12} or greater 1×10^{14} or greater*
	*Treated with activated alumina	
Dielectric Strength (60 cycles, 0.1 inch gap)	40 KV or greater	40 KV or greater
Dielectric Constant		
at 25°C. & 60 cycles	2.66	2.57
at 25°C. & 1000 cycles	2.64	2.57
at 100°C. & 60 cycles	2.50	2.45
at 100°C. & 1000 cycles	2.50	2.45
Power Factor		
at 25°C. & 60 cycles	0.09%	0.3%
at 25°C. & 1000 cycles	0.07%	0.08%
at 100°C. & 60 cycles	0.39%	1.7%
at 100°C. & 1000 cycles	0.16%	0.16%

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TOWOLDMON0038474
WATER_PCB-00022943

MIPB			DIPB		
Freq. c/s	K	tan δ	Freq. c/s	K	tan δ
10^2	2.61	.0150	10^2	2.54	.0006
10^3	2.61	.0015	10^3	2.54	.00006
10^4	2.61	.00015	10^4	2.54	.00002
10^5	2.61	.00006	10^5	2.54	.00004
10^6	2.61	.0001	10^6	2.54	.00019
10^7	2.61	.0012	10^7	2.54	.0019
10^8	2.60	.0015	10^8	2.53	.0135
$3x10^8$	2.57	.0220	$3x10^8$	2.49	.0190
10^9	2.52	.0183	10^9	2.44	.0120
$3x10^9$	2.51	.0100	$3x10^9$	2.41	.0066
$8.6x10^9$	--	--	$8.6x10^9$	--	--

Toxicity

Both MIPB and DIPB are of a low order of toxicity and, therefore, require no special handling. Available toxicity data may be summarized as follows:

Oral Toxicity (rats)
The Oral Lethal Dose in rats of 3.38 grams per kilogram classifies the material as "slightly toxic" from the standpoint of ingestion of single oral doses.

Skin Absorption (rabbits)
The material is not readily absorbed through the unbroken skin.

Skin and Eye Irritation (rabbits)
The sample produced no measurable irritation when applied to the skin for a period of 24 hours, nor did it cause any damage to eye tissues when instilled in the conjunctival sac.

Vapor Inhalation (rats)
Exposure to a high concentration of vapors for six hours failed to kill the rats.

Suggested Uses

Chemical Intermediate; Heat Exchanger Fluid where a pure hydrocarbon with excellent radiation resistance, thermal stability, and/or electric characteristics are required; Plasticizer and High Temperature Dielectric.

TOWOLDMON0038475
WATER_PCB-00022944

LOW TEMPERATURE ELECTRICAL DATA ON MIPB

FREQUENCY - CYCLES PER SECOND

	TEMP.	ELEC. PROPERTY	10^2	10^3	10^4	10^5
*	23°C.	K	2.645	2.645	2.645	2.645
		tan δ	.0071	.000079	.000032	.000032
	-3°	K	2.712	2.712	2.711	2.711
		tan δ	.00082	.00014	.000030	.00011
	-13°	K	2.751	2.751	2.750	2.749
		tan δ	.00011	.00003	.000015	.00014
	-22°	K	2.789	2.789	2.788	2.788
		tan δ	.000045	.00006	.000030	.00050
	-28°	K	2.831	2.830	2.827	2.826
		tan δ	.000015	.000044	.0001	.0013
	-34°	K	-----	2.916	2.9	2.890
		tan δ	-----	.00029	.00061	.0047
**	-32°	K	2.811	2.802	2.80	2.798
		tan δ	.0032	.00105	.00081	.0032
	-37°	K	2.811	2.816	2.815	2.809
		tan δ	.0026	.00066	.0013	.0024
	-43°	K	2.832	2.830	2.828	2.797
		tan δ	.0016	.00064	.0032	.0223
	-47°	K	2.845	2.844	2.836	2.717
		tan δ	.00076	.0015	.0090	.0298
	-51°	K	2.854	2.852	2.844	2.668
		tan δ	.001	.003	.0288	.0153
	-53°	K	2.858	2.854	2.746	2.658
		tan δ	.0013	.0098	.0310	.0108
	-55°	K	2.863	2.841	2.704	2.652
		tan δ	.0026	.0199	.0240	.0071
	-57°	K	2.866	2.811	2.681	2.649
		tan δ	.0044	.0278	.0175	.0048
	-59°	K	2.855	2.720	2.660	2.647
		tan δ	.0184	.0250	.0083	.0022

* Readings taken as samples are cooled.

** The readings taken as samples are heated.

TOWOLDMON0038476
WATER_PCB-00022945

EFFECT OF GAMMA RADIATION*
ON
THE PROPERTIES OF MIPB

*Materials Testing Reactor Gamma Facility

Characteristic	GAMMA DOSAGE (R)					
	None	3×10^7	1.4×10^8	3×10^8	1×10^9	5×10^9
Viscosity (cs) at 400°F.	0.58	0.58	0.64	0.58	0.61	0.76
Viscosity (cs) at 210°F.	1.42	1.63	1.52	1.47	1.63	2.51
Viscosity (cs) at 130°F.	3.06	3.39	3.51	3.37	3.69	7.10
Viscosity (cs) at 100°F.	4.50	----	5.20	----	5.80	13.5
Viscosity (cs) at -40°F.	2610	2674	3003	3362	8103	(high)
Flash Point (°F.)	315	315	310	310	305	305
Fire Point (°F.)	340	330	330	330	330	335
A.I.T. (°F.)	845	895	880	890	900	885
Pour Point (°F.)	-70	-75	-80	-75	-70	-45
Evap. Loss (%) 22 hours at 210°F.	19.68	18.80	19.84	19.10	18.48	18.66
Neut. No. (mgKOH/gm)	0.02	0.02	0.02	0.03	0.03	0.04
ml(gas)/ml fluid	----	0.03	0.13	0.33	0.85	3.6
Refractive Index (N_D^{25})	1.5798	1.5798	1.5801	1.5801	1.5822	1.5890
Sp. Gr. (68/68°F.)	0.9847	0.9847	0.9854	0.9861	0.9895	1.0028
Shell 4-Ball Wear (1200 rpm-2 hrs.-75°C. -52-100 steel)						
4 KG	0.40-0.37	0.40-0.38	0.42-0.43	0.48-0.42	0.44-0.48	0.51-0.49
10 KG	0.49-0.56	0.52-0.54	0.53-0.52	0.51-0.52	0.50-0.56	0.59-0.60
40 KG	1.09-1.15	1.28-1.35	1.13-1.23	1.16-1.13	1.28-1.28	3.70+-3.70+
Rubber Swelling (%) (7808C)	176.8	171.3	169.1	167.5	155.4	134.5
R Stock (8446)	181.7	171.7	184.8	213.6	195.4	159.5

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MM:md 5/1/58 - 1000
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TOWOLDMON0038477
WATER_PCB-00022946