

MONOISOPROPYLBIPHENYL (MIPB)

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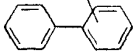
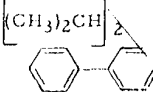
Technical Data Sheet

May 1, 1958

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DEVELOPMENT DEPARTMENT
MONSANTO CHEMICAL COMPANYMONSANTO COMPANY
ORGANIC CHEMICALS DIVISION
SPRINGFIELD, MISSOURI

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.

	<u>MIPB</u>	<u>DIPB</u>
Formula:	$(\text{CH}_3)_2\text{CH}$ 	$[(\text{CH}_3)_2\text{CH}]_2$ 
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

	<u>MIPB</u>	<u>DIPB</u>
<u>Refractive Index, n_D^{25}</u>	1.5798	1.563
<u>Specific Gravity</u>		
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
<u>Pounds per Gallon at 77°F.</u>	8.17	7.95

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	<u>MIPB</u>	<u>DIPB</u>
<u>Specific Heat, (Cal/gm, °C. or BTU/lb, °F.)</u>		
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
$C_p = 0.37 + 0.00048t$ (t = °F.)		$C_p = 0.386 + 0.000455t$ (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.)
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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.)
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Fire Point

171°C. (340°F.)	185°C. (365°F.)
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Pour Point

-57°C. (-70°F.)	-31°C. (-24°F.)
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Thermal Conductivity (over temperature range of 100°C. - 220°C.)

Cal/(cm ²)(°C./cm)(sec)	28.8 x 10 ⁻⁵	28.1 x 10 ⁻⁵
BTU/(ft ²)(°F/ft)(hr)	0.070	0.068

NUCLEAR PROPERTIES

	<u>MIPB</u>	<u>DIPB</u>
<u>N_H(atoms of Hydrogen/cc)</u>		
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

	<u>MIPB</u>	<u>DIPB</u>
<u>Resistivity (ohm-cm)</u>	1×10^{12} or greater 1×10^{14} or greater*	1×10^{12} or greater 1×10^{14} or greater*

*Treated with activated alumina

<u>Dielectric Strength (60 cycles, 0.1 inch gap)</u>	40 KV or greater	40 KV or greater
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<u>Dielectric Constant</u>		
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

<u>Power Factor</u>		
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%

<u>MIPB</u>			<u>DIPB</u>		
<u>Freq. c/s</u>	<u>K</u>	<u>tan δ</u>	<u>Freq. c/s</u>	<u>K</u>	<u>tan δ</u>
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
3×10^8	2.57	.0220	3×10^8	2.49	.0190
10^9	2.52	.0183	10^9	2.44	.0120
3×10^9	2.51	.0100	3×10^9	2.41	.0066
8.6×10^9	--	--	8.6×10^9	--	--

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.

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.

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.	2615	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
Acid 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
Sh. Gr. (68/68°F.)	0.9847	0.9847	0.9854	0.9861	0.9895	1.0028
Cell 4-Ball Wear (1200 rpm-2 hrs. - 7°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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