Chemical Testing Results

MICROCHEM® 4000

ACRONYMS KEY

—	Not reported
MDPR	Minimum detectable permeation rate
BDT	Breakthrough detection time (first appearance after the MDPR)
BT 0.1	Normalised breakthrough detection time at 0.1 µg/cm²/min
BT 1.0	Normalised breakthrough detection time at 1.0 µg/cm²/min
EN Class	Based on the mean BT (or lowest if the mean is not available) at 1.0µg/cm2/min according to ISO 6529
CP	Cumulative permeation after 480 min. If no permeation detected, then reported as <(MDPR x 480)
CPT	Time to cumulative permeation of 150 µg/cm²
PR	Steady state permeation rate. If not reached then maximum permeation rate for the duration of the test is reported. If no permeation is detected then reported as <MDPR

EN Class	Normalised Breakthrough Time in minutes
0	Immediate (no class)
1	≥ 10
2	≥ 30
3	≥ 60
4	≥ 120
5	≥ 240
6	≥ 480 (or >540)

CAS Number	Chemical Name	MDPR µg/cm²/min	BDT	BT 0.1µg/cm²/min	BT 1.0µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
64-19-7	Acetic Acid (glacial, 99.88% w/w)	≤0.05	-	-	>480	6	-	-	-	<1.0
108-24-7	Acetic Anhydride	≤0.05	-	-	>480	6	-	-	-	<1.0
67-64-1	Acetone	≤0.08	43	127	>480	6	-	-	-	<1.0
75-05-8	Acetonitrile	≤0.08	>480	>480	>480	6	-	-	-	<0.08
79-06-1	Acrylamide	-	-	-	>480	6	-	-	-	<1.0
79-10-7	Acrylic Acid	-	-	-	>480	6	-	-	-	<1.0
107-13-1	Acrylonitrile	-	-	-	>480	6	-	-	-	<1.0
7664-41-7	Ammonia Gas (>99.98% w/w, 1 atmos.)	≤0.05	5	18	60	2	-	-	-	-
7664-41-7	Ammonia Liquid (99%, liquified, -34 °C)	0.01	180	>480	>480	6	-	>480	6	0.02
1341-49-7	Ammonium Hydrogen Fluoride	-	-	-	>480	6	-	-	-	<1.0
1336-21-6	Ammonium Hydroxide (28%)	-	-	-	>480	6	-	-	-	<1.0
1336-21-6	Ammonium Hydroxide (35%)	0.02	5	13	124	4	-	268	5	1.04
628-63-7	Amyl Acetate	-	-	-	>480	6	-	-	-	<1.0
62-53-3	Aniline	-	-	-	>480	6	-	-	-	<1.0
17804-35-2	Benlate®	-	-	-	>480	6	-	-	-	<1.0
71-43-2	Benzene	<0.05	21	157	>480	6	-	-	-	<0.25
100-44-7	Benzyl Chloride	0.02	>480	>480	>480	6	<9.60	>480	6	<0.02
7726-95-6	Bromine	-	-	-	10	1	-	-	-	-
106-99-0	Butadiene 1,3- (>99.0% w/w)	0.011	>480	>480	>480	6	<5.4	>480	6	<0.011
71-36-3	Butanol n-	-	-	-	>480	6	-	-	-	<1.0
141-32-2	Butyl Acrylate n-	-	-	-	>480	6	-	-	-	<1.0
75-15-0	Carbon Disulphide	-	Imm	Imm	2	0	-	-	-	-
7782-50-5	Chlorine (liquid, satd., 99.9+%)	-	-	-	>480	6	-	-	-	<1.0
7782-50-5	Chlorine Gas (>99.8% w/w, 1 atmos.)	0.020	196	402	>480	6	24	>480	6	0.11
70258-18-3	Chloro-5-(chloromethyl)pyridine, 2-	0.5	-	-	>480	6	-	-	-	<1.0
79-11-8	Chloroacetic Acid (79% w/w)	-	-	-	>480	6	-	-	-	<1.0
105-39-5	Chloroacetic Acid Ethyl Ester (99% w/w)	-	-	-	>480	6	-	-	-	<1.0
79-04-9	Chloroacetyl Chloride	-	-	-	>480	6	-	-	-	<1.0
920-37-6	Chloroacrylonitrile, 2-	<0.1	-	-	>480	6	-	-	-	<1.0
106-47-8	Chloroaniline, 4- (75 °C)	-	-	-	>480	6	-	-	-	<1.0
108-90-7	Chlorobenzene	-	-	-	>480	6	-	-	-	<1.0
67-66-3	Chloroform	-	-	-	11	1	-	-	-	-
74-87-3	Chloromethane (99.9% w/w)	0.023	>480	>480	>480	6	<11	>480	6	<0.023
7790-94-5	Chlorosulphonic Acid	-	-	-	69	3	-	-	-	-
95-49-8	Chlorotoluene, o-	-	-	-	>480	6	-	-	-	<1.0
106-43-4	Chlorotoluene, p-	-	-	-	>480	6	-	-	-	<1.0
1333-82-0	Chromium Trioxide (50% w/w)	0.09	>480	>480	>480	6	<43.2	>480	6	<0.09
108-39-4	Cresol, m- in water solution (20 g/l)	<0.1	-	-	>480	6	-	-	-	<1.0
95-48-7	Cresol, o- in water solution (20 g/l)	<0.1	-	-	>480	6	-	-	-	<1.0
106-44-5	Cresol, p- in water solution (20 g/l)	<0.1	-	-	>480	6	-	-	-	<1.0
65996-89-6	Crude Coal Tar	<1.0	-	-	>480	6	-	-	-	<1.0
98-82-8	Cumene (99.9% w/w)	0.016	>480	>480	>480	6	<7.7	>480	6	<0.016
108-91-8	Cyclohexylamine (>99.5% w/w)	0.05	49	55	82	3	-	-	-	-
N/A	D23 & D83 Paint Removers	-	-	-	10	-	-	-	-	-
110-05-4	Di-tert-butyl peroxide (98% w/w)	<0.05	>480	>480	>480	6	-	-	-	<0.05
328-84-7	Dichloro-4-(trifluoromethyl)benzene, 1,2-	-	-	-	>480	6	-	-	-	<1.0
513-88-2	Dichloroacetone, 1,1-	-	-	-	>480	6	-	-	-	<1.0
534-07-6	Dichloroacetone, 1,3-	-	-	-	>480	6	-	-	-	<1.0
111-44-4	Dichlorodiethylether, 2,2-	-	-	-	>480	6	-	-	-	<1.0
107-06-2	Dichloroethane, 1,2-	0.02	>480	>480	>480	6	<9.6	>480	6	<0.02
75-09-2	Dichloromethane (99.99% w/w)	-	-	-	9	0	-	93	3	2.94
75-54-7	Dichloromethylsilane (>99% w/w%)	-	-	-	20	1	-	-	-	-
68334-30-5	Diesel	-	-	-	>480	6	-	-	-	<1.0
111-42-2	Diethanolamine (99% w/w)	-	-	-	>480	6	-	-	-	<1.0
60-29-7	Diethyl Ether	-	-	-	2	0	-	-	-	-
109-89-7	Diethylamine (99.9% w/w)	0.019	Imm	Imm	Imm	0	-	8	0	90.1
111-40-0	Diethylenetriamine	-	-	-	>480	6	-	-	-	<1.0
367-25-9	Difluoroaniline, 2,4-	-	-	-	>480	6	-	-	-	<1.0
4525-33-1	Dimethyl Dicarbonate	<1.0	-	-	>480	6	-	-	-	<1.0

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MICROCHEM® 4000

Chemical Testing Results

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CP	Cumulative permeation after 480 min. If no permeation detected, then reported as <(MDPR x 480)
CPT	Time to cumulative permeation of 150 µg/cm²
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EN Class	Normalised Breakthrough Time in minutes
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1	≥ 10
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CAS Number	Chemical Name	MDPR µg/cm²/min	BDT	BT 0.1µg/cm²/min	BT 1.0µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
624-49-7	Dimethyl Fumarate	-	>480	>480	>480	-	-	-	-	-
77-78-1	Dimethyl Sulphate	-	-	-	>480	6	-	-	-	<1.0
67-68-5	Dimethyl Sulphoxide (99+%)	-	-	-	>480	6	-	-	-	<1.0
127-19-5	Dimethylacetamide, N,N- (liquid)	-	-	-	>480	6	-	-	-	<1.0
124-40-3	Dimethylamine (40% w/w)	-	-	-	>480	6	-	-	-	<1.0
75-78-5	Dimethyldichlorosilane	0.03	137	171	234	4	-	286	5	-
68-12-2	Dimethylformamide, N,N-	0.0094	>480	>480	>480	6	<4.5	>480	6	<0.0094
68-12-2	Dimethylformamide, N,N- (>99.8% w/w)	<0.05	>480	>480	>480	6	-	-	-	<0.05
123-91-1	Dioxane, 1,4-	0.05	>480	>480	>480	6	<26	>480	6	0.1
34590-94-8	Dipropylene Glycol Methyl Ether	-	-	-	>480	6	-	-	-	<1.0
56-18-8	Dipropylenetriamine	<1.0	-	-	>480	6	-	-	-	<1.0
106-89-8	Epichlorohydrin (99%)	-	-	-	>480	6	-	-	-	<1.0
64-17-5	Ethanol	<0.1	>480	>480	>480	6	-	-	-	<0.1
141-43-5	Ethanolamine (98% w/w)	-	-	-	>480	6	-	-	-	<1.0
563-12-2	Ethion	<1.0	-	-	>480	6	-	-	-	<1.0
141-78-6	Ethyl Acetate (99.98% w/w)	≤0.08	28	40	>480	6	-	-	-	<1.0
56-38-2	Ethyl Parathion	<1.0	-	-	>480	6	-	-	-	<1.0
100-41-4	Ethylbenzene	-	-	-	>480	6	-	-	-	<1.0
106-93-4	Ethylene Dibromide	0.06	376	408	>480	6	66.9	>480	6	0.33
107-21-1	Ethylene Glycol	-	-	-	>480	6	-	-	-	<1.0
75-21-8	Ethylene Oxide (gas at ca. 1 atmos.)	<0.1	>480	>480	>480	6	-	-	-	<0.1
107-15-3	Ethylenediamine	-	-	-	>480	6	-	-	-	<1.0
149-57-5	Ethylhexanoic Acid, 2-	-	-	-	>480	6	-	-	-	<1.0
462-06-6	Fluorobenzene	-	-	-	105	3	-	-	-	-
50-00-0	Formaldehyde (37%)	0.0003	>480	>480	>480	6	NR	>480	6	<0.0003
64-18-6	Formic Acid (90%)	-	-	-	>480	6	-	-	-	<1.0
98-01-1	Furfural	-	-	-	>480	6	-	-	-	<1.0
121-75-5	Fyfanon	<1.0	-	-	>480	6	-	-	-	<1.0
68476-33-5	Gas Oil (SHELL "Heizoel HVS 300 CST")	-	-	-	>480	6	-	-	-	<1.0
142-82-5	Heptane, n- (99.8% w/w)	≤0.08	49	73	>480	6	-	-	-	0.12
87-68-3	Hexachloro-1,3-butadiene	0.09	>480	>480	>480	6	-	-	-	<0.09
999-97-3	Hexamethyldisilazane	-	-	-	>480	6	-	-	-	<1.0
110-54-3	Hexane, n-	0.09	>480	>480	>480	6	-	-	-	<0.09
592-41-6	Hexene, 1- (97%)	0.02	>480	>480	>480	6	<9.6	>480	6	<0.02
7803-57-8	Hydrazine monohydrate (98%, containing hydrazine, 64-65% w/w)	<1.0	>480	-	>480	6	-	-	-	<1.0
10035-10-6	Hydrobromic Acid	<0.1	>480	>480	>480	6	-	-	-	<0.1
7647-01-0	Hydrochloric Acid (36-37% w/w)	0.01	-	-	>480	6	-	-	-	<1.0
7664-39-3	Hydrofluoric Acid (37%)	<0.1	-	-	>480	6	-	-	-	<1.0
7664-39-3	Hydrofluoric Acid (71-75% w/w)	<0.05	8	175	>480	6	-	-	-	0.89
16961-83-4	Hydrofluorosilicic Acid	0.04	>480	>480	>480	6	<19.2	>480	6	<0.04
7647-01-0	Hydrogen Chloride Gas (>99.0% w/w, 1 atmos.)	≤0.05	8	125	>480	6	-	-	-	<1.0
74-90-8	Hydrogen Cyanide	0.01	48	159	>480	6	-	-	-	0.16
7664-39-3	Hydrogen Fluoride (99%, liquified, 17 °C)	0.01	90	110	190	4	-	350	5	1.82
7664-39-3	Hydrogen Fluoride Gas (anhydrous)	0.001	-	-	42	2	-	-	-	-
7722-84-1	Hydrogen Peroxide (35%)	-	-	-	>480	6	-	-	-	<1.0
7783-06-4	Hydrogen Sulphide (>99% w/w)	0.04	>480	>480	>480	6	-	-	-	<0.04
67-63-0	Isopropyl Alcohol	-	-	-	>480	6	-	-	-	<1.0
108-31-6	Maleic Anhydride	-	-	-	>480	6	-	-	-	<1.0
7439-97-6	Mercury	0.05	>480	>480	>480	6	<24.0	>480	6	<0.05
124-63-0	Methanesulphonyl Chloride (99.8 wt%)	0.04	>480	>480	>480	6	<19.2	>480	6	<0.04
67-56-1	Methanol (>99.5% w/w)	≤0.08	21	>480	>480	6	-	-	-	<0.1
79-22-1	Methyl Chloroformate	<0.5	-	-	>480	6	-	-	-	<1.0
78-93-3	Methyl Ethyl Ketone	<0.1	9	53	>480	6	-	-	-	<1.0
80-62-6	Methyl Methacrylate (>99.0% w/w)	<0.05	>480	>480	>480	6	-	-	-	<0.05
298-00-0	Methyl Parathion	<1.0	-	-	>480	6	-	-	-	<1.0
872-50-4	Methyl-2-pyrrolidone, N-	0.05	-	-	>480	6	-	-	-	<1.0
75-79-6	Methyltrichlorosilane	0.02	>480	>480	>480	6	<9.60	>480	6	<0.02
54-11-5	Nicotine (>99.0 % w/w)	0.6	>480	-	>480	6	<288	>250	5	<0.6
7697-37-2	Nitric Acid (≥99.5%)	<0.06	>480	>480	>480	6	-	-	-	<0.06

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BT 1.0	Normalised breakthrough detection time at 1.0 µg/cm²/min
EN Class	Based on the mean BT (or lowest if the mean is not available) at 1.0µg/cm2/min according to ISO 6529
CP	Cumulative permeation after 480 min. If no permeation detected, then reported as <(MDPR x 480)
CPT	Time to cumulative permeation of 150 µg/cm²
PR	Steady state permeation rate. If not reached then maximum permeation rate for the duration of the test is reported. If no permeation is detected then reported as <MDPR

EN Class	Normalised Breakthrough Time in minutes
0	Immediate (no class)
1	≥ 10
2	≥ 30
3	≥ 60
4	≥ 120
5	≥ 240
6	≥ 480 (or >540)

CAS Number	Chemical Name	MDPR µg/cm²/min	BDT	BT 0.1µg/cm²/min	BT 1.0µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
7697-37-2	Nitric Acid (Conc.. 70% w/w)	<0.05	>480	>480	>480	6	-	-	-	<0.05
98-95-3	Nitrobenzene (99.99% w/w)	0.024	>480	>480	>480	6	<11	>480	6	<0.024
100-00-5	Nitrochlorobenzene. p- (88 °C)	<0.5	-	-	>480	6	-	-	-	<1.0
5283-66-9	Octyltrichlorosilane	0.08	-	-	198	4	-	-	-	-
92062-35-6	Paraffin	-	-	-	>480	6	-	-	-	-
8006-61-9	Petrol (unleaded)	-	-	-	>480	6	-	-	-	<1.0
108-95-2	Phenol (Liquid. 45 °C)	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
108-95-2	Phenol (liquified. approx. 90% w/w with water)	<0.1	>480	>480	>480	6	-	-	-	<0.1
108-95-2	Phenol in water solution (24 g/l)	-	-	-	>480	6	-	-	-	-
108-95-2 (in	Phenol/Benzyl Alcohol 25/5	-	-	-	>480	6	-	-	-	<1.0
98-13-5	Phenyltrichlorosilane	0.03	>480	>480	>480	6	<14.4	>480	6	<0.03
75-44-5	Phosgene Gas	0.05	-	-	387	5	-	-	-	-
7664-38-2	Phosphoric Acid (85+%)	-	-	-	>480	6	-	-	-	<1.0
10025-87-3	Phosphorus Oxychloride	0.005	>480	>480	>480	6	<2.4	>480	6	<0.005
10026-13-8	Phosphorus Pentachloride	-	-	-	>480	6	-	-	-	<1.0
7719-12-2	Phosphorus Trichloride (99% w/w)	-	-	-	>480	6	-	-	-	<1.0
75-98-9	Pivalic Acid	-	-	-	>480	6	-	-	-	<1.0
25322-68-3	Polyethylene Glycol 200	-	-	-	>480	6	-	-	-	<1.0
115-07-1	Propene	0.02	>480	>480	>480	6	<9.6	>480	6	<0.02
123-38-6	Propionaldehyde	-	-	-	>480	6	-	-	-	<1.0
79-09-4	Propionic Acid	-	-	-	>480	6	-	-	-	<1.0
107-12-0	Propionitrile	-	-	-	>480	6	-	-	-	<1.0
106-94-5	Propyl Bromide. n-	0.05	47	51	89	3	-	170	4	2.97
75-56-9	Propylene Oxide (99%)	<0.05	3	3	17	1	-	-	-	-
91-22-5	Quinoline (98% w/w)	0.08	>480	>480	>480	6	<38.4	>480	6	<0.08
85-00-7	Reglone®	-	-	-	>480	6	-	-	-	<1.0
52315-07-8	Ripcord®	-	-	-	>480	6	-	-	-	<1.0
38641-94-0	Roundup®	-	-	-	>480	6	-	-	-	<1.0
7647-14-5	Sodium Chloride	-	-	-	>480	6	-	-	-	<1.0
143-33-9	Sodium Cyanide (satd. soln.)	-	-	-	>480	6	-	-	-	<1.0
7681-49-4	Sodium Fluoride (satd.)	-	-	-	>480	6	-	-	-	<1.0
1310-73-2	Sodium Hydroxide (aq.. 40% w/w)	≤0.05	>480	>480	>480	6	-	-	-	<0.05
1310-73-2	Sodium Hydroxide (aq.. 50% w/w. 80 °C)	0.031	>480	>480	>480	6	<26.0	>480	6	<0.031
1310-73-2	Sodium Hydroxide (aq.. 50% w/w)	0.068	>480	>480	>480	6	<33	>480	6	<0.068
7681-52-9	Sodium Hypochlorite Solution (aq.. 14.5 wt% available chlorine)	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
7681-52-9	Sodium Hypochlorite Solution (aq.. 5% available chlorine)	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
16893-85-9	Sodium Silicofluoride (satd.)	-	-	-	>480	6	-	-	-	<1.0
100-42-5	Styrene	0.04	159	189	299	5	-	310	5	5.4
7446-09-5	Sulphur Dioxide Gas	0.001	-	-	>480	6	-	-	-	<1.0
7664-93-9	Sulphuric Acid (50% w/w. 80 °C)	0.021	>480	>480	>480	6	<10.0	>480	6	<0.021
7664-93-9	Sulphuric Acid (50% w/w)	<0.05	>480	>480	>480	6	-	-	-	<0.05
7664-93-9	Sulphuric Acid (95-96% w/w)	≤0.05	>480	>480	>480	6	-	-	-	<0.05
7664-93-9	Sulphuric Acid (98+%)	<0.1	-	-	>480	6	-	-	-	<0.1
306-83-2	SUVA HCFC-123 (1.1-Dichloro-2.2.2-trifluoroethane)	-	-	-	380	5	-	-	-	-
1634-04-4	t-Butyl Methyl Ether	<0.1	-	-	>480	6	-	-	-	<1.0
127-18-4	Tetrachloroethylene (99.9% w/w)	0.030	30	218	>480	6	42	>480	6	0.17
109-99-9	Tetrahydrofuran	≤0.08	Imm	Imm	5	0	-	-	-	-
75-59-2	Tetramethyl Ammonium Hydroxide (satd.)	-	-	-	>480	6	-	-	-	<1.0
7719-09-07	Thionyl Chloride	-	-	-	2	0	-	-	-	-
1758-73-2	Thiourea Dioxide (satd.)	-	-	-	>480	6	-	-	-	<1.0
7550-45-0	Titanium Tetrachloride	0.08	159	173	>480	6	-	>480	6	0.43
108-88-3	Toluene	0.042	3	69	>480	6	65	>480	6	0.17
108-88-3	Toluene (99.99 wt%)	≤0.08	<6	<6	>480	6	-	-	-	0.67
584-84-9	Toluene-2.4-diisocyanate	-	-	-	>480	6	-	-	-	<1.0
95-53-4	Toluidine. o-	-	-	-	>480	6	-	-	-	<1.0
36768-62-4	Triacetonediamine	-	-	-	>480	6	-	-	-	<1.0
76-03-9	Trichloroacetic Acid (98%)	<1.0	-	-	>480	6	-	-	-	<1.0
79-01-6	Trichloroethylene	-	-	-	7	0	-	-	-	-
121-44-8	Triethylamine	-	-	-	5	0	-	-	-	-

Important: Breakthrough time alone is not sufficient to determine how long a garment may be worn once the garment has been contaminated. Safe wear time may be longer or shorter depending on numerous other factors, including the toxicity, exposure conditions and permeation behaviour of the substance.

Safety Note

All chemical tests and breakthrough times given relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times, particularly when worn or damaged. It is the user's responsibility to select an appropriate garment, gloves, boots and other equipment for the particular use. The user shall be responsible for determining how long the garment can be worn for the particular use and whether it can be suitably cleaned for re-use. Microgard Limited does not give any warranties or make any representations about its garments other than those contained in the official literature supplied by Microgard Limited with each garment.

MICROCHEM® 4000

Chemical Testing Results

MICROCHEM® 4000

ACRONYMS KEY

—	Not reported
MDPR	Minimum detectable permeation rate
BDT	Breakthrough detection time (first appearance after the MDPR)
BT 0.1	Normalised breakthrough detection time at 0.1 µg/cm²/min
BT 1.0	Normalised breakthrough detection time at 1.0 µg/cm²/min
EN Class	Based on the mean BT (or lowest if the mean is not available) at 1.0µg/cm2/min according to ISO 6529
CP	Cumulative permeation after 480 min. If no permeation detected, then reported as <(MDPR x 480)
CPT	Time to cumulative permeation of 150 µg/cm²
PR	Steady state permeation rate. If not reached then maximum permeation rate for the duration of the test is reported. If no permeation is detected then reported as <MDPR

EN Class	Normalised Breakthrough Time in minutes
0	Immediate (no class)
1	≥ 10
2	≥ 30
3	≥ 60
4	≥ 120
5	≥ 240
6	≥ 480 (or >540)

CAS Number	Chemical Name	MDPR µg/cm²/min	BDT	BT 0.1µg/cm²/min	BT 1.0µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
1493-13-6	Trifluoromethanesulphonic Acid	0.06	>480	>480	>480	6	<28.8	>480	6	<0.06
108-05-4	Vinyl Acetate (99.97% w/w)	0.022	>480	>480	>480	6	<11	>480	6	<0.022
2177-18-6	Vinyl Acrylate	-	-	-	>480	6	-	-	-	<1.0
57458-41-0	Vinyl Benzyl Chloride	-	-	-	>480	6	-	-	-	<1.0
1330-20-7	Xylene, m-	-	-	-	>480	6	-	-	-	<1.0
1477-55-0	Xylylenediamine, m-	-	-	-	>480	6	-	-	-	<1.0

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