

Tychem® C

Model CHA5



Chemical Name	Physical State	CAS	BT Act mins	BT 0.1 mins	BT 1.0 mins	EN	S SPR $\mu\text{g}/\text{c m}^2/\text{min}$	MDPR $\mu\text{g}/\text{c m}^2/\text{min}$	Cum 480 $\mu\text{g}/\text{c m}^2$	Time 150 mins	ISO
Acetic acid (>95%)	Liquid	64-19-7	imm	imm	imm		3	0.05 ppm			
Acetic acid ethyl ester	Liquid	141-78-6	imm	imm	imm		12.7	0.11 ppm			
Acetone	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Acetonitrile	Liquid	75-05-8	imm	imm	imm		16	0.23 ppm			
Acroleic acid	Liquid	79-10-7	imm	imm	imm		5.4	0.2			
Acrylic acid	Liquid	79-10-7	imm	imm	imm		5.4	0.2			
Acrylonitrile	Liquid	107-13-1	imm	imm	imm		10.6	0.005			
Amino benzene	Liquid	62-53-3	imm	imm	imm		2.1	0.14			
Ammonia (gaseous)	Vapor	7664-41-7	imm	imm	imm		3.1	0.001			
Ammonium aqueous (28%)	Liquid	1336-21-6	imm	imm	imm		62	0.035			
Ammonium hydroxide (28%)	Liquid	1336-21-6	imm	imm	imm		62	0.035			
Aniline	Liquid	62-53-3	imm	imm	imm		2.1	0.14			

Benzenamine	Liquid	62-53-3	imm	imm	imm		2.1	0.14			
Bromine	Liquid	7726-95-6	imm	imm	imm		>50	0.0064			
Butadiene, 1,3-	Vapor	106-99-0	imm	imm	imm		>17	0.001			
Butan-1-ol	Liquid	71-36-3	imm	imm	imm		1.6	0.057 ppm			
Butanal, n-	Liquid	123-72-8	imm	imm	imm		22	0.0063			
Butanol, 1-	Liquid	71-36-3	imm	imm	imm		1.6	0.057 ppm			
Butanol, n-	Liquid	71-36-3	imm	imm	imm		1.6	0.057 ppm			
Butyl alcohol, n-	Liquid	71-36-3	imm	imm	imm		1.6	0.057 ppm			
Butyraldehyde, n-	Liquid	123-72-8	imm	imm	imm		22	0.0063			
Carbon disulfide	Liquid	75-15-0	imm	imm	imm		4367	0.0057 ppm			
Carmustine (3.3 mg/ml, 10 % Ethanol)	Liquid	154-93-8	18*	>480	>480	6	0.03	0.006	33	>480	6
Caustic ammonia (28%)	Liquid	1336-21-6	imm	imm	imm		62	0.035			
Caustic soda (42%)	Liquid	1310-73-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Caustic soda (50%)	Liquid	1310-73-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Chlorine	Vapor	7782-50-5	imm	imm	imm		>50	0.2			
Chloro ethanol, 2-	Liquid	107-07-3	imm	imm	imm		3.1	0.06 ppm			
Chromic acid (H2SO4 x CrO3) (80%)	Liquid	1333-82-0	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Cyanoethylene	Liquid	107-13-1	imm	imm	imm		10.6	0.005			
Cyanomethane	Liquid	75-05-8	imm	imm	imm		16	0.23 ppm			
Dichloromethane	Liquid	75-09-2	imm	imm	imm		>50	0.001			
Diesel automotive test fuel	Liquid	N/A	imm	imm	imm		3.29	0.01			
Diethyl amine	Liquid	109-89-7	imm	imm	imm		64.3	0.017 ppm			
Dimethyl ketal	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Dimethyl ketone	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Epoxy ethane	Vapor	75-21-8	imm	imm	imm		170	0.02			
Ethane 1,2-diol	Liquid	107-21-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethane nitrile	Liquid	75-05-8	imm	imm	imm		16	0.23 ppm			
Ethyl acetate	Liquid	141-78-6	imm	imm	imm		12.7	0.11 ppm			
Ethyl ethanamine, N-	Liquid	109-89-7	imm	imm	imm		64.3	0.017 ppm			
Ethyl nitrile	Liquid	75-05-8	imm	imm	imm		16	0.23 ppm			
Ethylene carboxylic acid	Liquid	79-10-7	imm	imm	imm		5.4	0.2			

Ethylene chlorohydrin	Liquid	107-07-3	imm	imm	imm		3.1	0.06 ppm			
Ethylene glycol	Liquid	107-21-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethylene oxide	Vapor	75-21-8	imm	imm	imm		170	0.02			
Ethylene tetrachloride	Liquid	127-18-4	imm	imm	imm		>400	0.11 ppm			
Ferric (III) chloride (40%)	Liquid	7705-08-0	>480	>480	>480	6	<0.005	0.005	<2.5	>480	6
Formaldehyde (10%)	Liquid	50-00-0	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Formaldehyde (37%)	Liquid	50-00-0	imm	imm	>480	6	0.31	0.1			
Formalin (10%)	Liquid	50-00-0	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Formalin (37%)	Liquid	50-00-0	imm	imm	>480	6	0.31	0.1			
Fuel oil	Liquid	68476-30-2	imm	imm	imm		1.776	0.01			
Fuel-oil no 2	Liquid	68476-30-2	imm	imm	imm		1.776	0.01			
Glycol alcohol	Liquid	107-21-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Glycol chlorohydrin	Liquid	107-07-3	imm	imm	imm		3.1	0.06 ppm			
Hydrochloric acid (32%)	Liquid	7647-01-0	>480	>480	>480	6	<0.001	0.001			
Hydrochloric acid (37%)	Liquid	7647-01-0	60*	265*	>480	6	0.46	0.001			
Hydrofluoric acid (48%)	Liquid	7664-39-3	7	17	>480	6	N/A	0.005	134	>480	6
Hydrofluoric acid (60%)	Liquid	7664-39-3	imm	6	81	3	n/a	0.005			
Hydrofluoric acid (70%)	Liquid	7664-39-3	imm	imm	15*	1	15.3	0.1			
Hydrogen peroxide (50%)	Liquid	7722-84-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Hydrogen peroxide (70%)	Liquid	7722-84-1	>480	>480	>480	6	<0.02	0.02	<10	>480	6
Iodomethane	Liquid	74-88-4	imm	imm	imm		nm	0.07	4550 µg/cm ² , 8 min		<1
Ketone propane	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Limonene d- (Mixture)	Liquid	5989-27-5	imm	imm	imm		29.8	0.02			
Mercuric II chloride (sat)	Liquid	7487-94-7	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Mercury	Liquid	7439-97-6	>480	>480	>480	6	<0.09	0.09	<43.2	>480	6
Methanol	Liquid	67-56-1	imm	imm	imm		2.2	0.18 ppm			
Methyl 4-isopropenyl-1-cyclohexen e, 1- (Mixture)	Liquid	5989-27-5	imm	imm	imm		29.8	0.02			
Methyl acetyl	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Methyl benzol	Liquid	108-88-3	imm	imm	imm		503	0.033 ppm			
Methyl cyanide	Liquid	75-05-8	imm	imm	imm		16	0.23 ppm			
Methyl iodide	Liquid	74-88-4	imm	imm	imm		nm	0.07	4550 µg/cm ² ,		<1

								8 min			
Methyl ketone	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Methylene chloride	Liquid	75-09-2	imm	imm	imm		>50	0.001			
Nitric acid (70%)	Liquid	7697-37-2	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Nitro benzene	Liquid	98-95-3	imm	imm	imm		17.7	0.001			
Oleum (30%)	Liquid	8014-95-7	18	82	105	3	nm	0.005			
Perchloric acid (70%)	Liquid	7601-90-3	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Phenyl amine	Liquid	62-53-3	imm	imm	imm		2.1	0.14			
Phosphoric acid (85%)	Liquid	7664-38-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Potassium chromate (sat)	Liquid	7789-00-6	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Potassium hydroxide (50%)	Liquid	1310-58-3	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Propan-2-one	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Propene acid	Liquid	79-10-7	imm	imm	imm		5.4	0.2			
Propenenitrile, 2-	Liquid	107-13-1	imm	imm	imm		10.6	0.005			
Propenoic acid nitrile	Liquid	107-13-1	imm	imm	imm		10.6	0.005			
Pyroacetic ether	Liquid	67-64-1	imm	imm	imm		9.7	0.11 ppm			
Sodium fluoride (sat)	Liquid	7681-49-4	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Sodium hydroxide (42%)	Liquid	1310-73-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Sodium hydroxide (50%)	Liquid	1310-73-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Sodium hypochlorite (10-15%)	Liquid	7681-52-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Sulfuric acid (>95%)	Liquid	7664-93-9	>480	>480	>480	6	<0.02	0.020	<9.6	>480	6
Sulfuric acid (50%)	Liquid	7664-93-9	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Sulfuric acid fuming (30%)	Liquid	8014-95-7	18	82	105	3	nm	0.005			
Tetrachloro ethylene, 1,1,2,2-	Liquid	127-18-4	imm	imm	imm		>400	0.11 ppm			
Tetrahydrofuran	Liquid	109-99-9	imm	imm	imm		183	0.11 ppm			
Tetramethyl ammonium hydroxide (25%)	Liquid	75-59-2	nm	>480	>480	6	N/A	0.037			
Toluene	Liquid	108-88-3	imm	imm	imm		503	0.033 ppm			

- BT Act (Actual) Breakthrough time at MDPR
- BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min
- BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min
- EN Classification according to EN 14325
- SSPR Steady state permeation rate

- M DPR Minimum detectable permeation rate
- CUM 480 Cumulative permeation mass after 480 mins
- Time 150 Time to reach cumulative permeation mass of 150 µg/cm²
- ISO Classification according to ISO 16602
- CAS Chemical abstracts service registry number
- mins Minutes
- > Larger than
- < Smaller than
- imm Immediate (< 4 min)
- nm Not tested
- sat Saturated solution
- N/A Not Applicable
- * Based on lowest single value
- 8 Actual breakthrough time; normalized breakthrough time is not available

Important Note

The permeation data published have been generated for DuPont by independent accredited testing laboratories according to the test method applicable at that time*. The data is typically the average of three samples tested.

* EN369, ASTM F739, EN 374-3 or EN ISO 6529 (method A and B)

Cumulative permeation data have been measured or have been calculated based on steady state permeation rate.

All chemicals have been tested at a concentration of greater than 95% unless otherwise stated. The tests were performed at room temperature and environmental pressure unless otherwise stated.

A different temperature may have significant influence on the breakthrough time.

Permeation typically increases with temperature.

Permeation data are usually measured for single chemicals. The permeation characteristics of mixtures can often deviate considerably from the behaviour of the individual chemicals.

Breakthrough time is not the same as safe wear time. Breakthrough time alone is insufficient to determine how long a garment may be worn once the garment has been contaminated. Safe user wear time may be longer or shorter than the breakthrough time depending on the permeation behaviour of the substance, the toxicity of the substance and the exposure conditions. Breakthrough times are indicative of the barrier performance, but results can vary between the test methods and laboratories.

Please use the permeation data as part of the risk assessment to assist the selection of a protective fabric, garment or accessory suitable for your application. Working conditions, exposure conditions (e.g. temperature, pressure, concentration, physical state), and the toxicity data for the chemical need to be taken into account.

Chemical warfare agents (Lewisite, Sarin, Soman, Mustard, Tabun and VX Nerve Agent) have been tested according to MIL-STD-282 at 22°C or according to FINABEL 0.7 at 37°C.

Permeation data for Tyvek® is applicable to white Tyvek® L1431N only and is not applicable for other Tyvek® styles or colours.

The information provided herein corresponds to our knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such material used in combination with any other materials or additives or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specification limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to conduct to determine for yourself the suitability of a specific material for your particular purposes. Since DuPont cannot anticipate all

variations in actual end-use conditions DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent rights.