

Physical Properties & Chemical Resistance of Polymers

 Excellent resistance - can withstand use over a long period of time without change in physical, optical or chemical properties.
 Good general resistance - minor attack may occur after long periods of storage.
 Limited resistance - product can be used for brief mixing and measuring.
 Poor resistance - product becomes unstable on contact with chemical.

	LDPE	HDPE	PP	PMP (TPX)	PVC	PC	PS	ACRYLIC (AC)	PTFE	PFA
Acids-Dilute	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent
Acids-concentrated	Excellent	Excellent	Excellent	Excellent	Excellent	Limited	Limited	Limited	Excellent	Excellent
Alcohols	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Aldehydes	Good	Good	Excellent	Good	Limited	Limited	Limited	Good	Excellent	Excellent
Bases	Excellent	Excellent	Excellent	Excellent	Excellent	Limited	Limited	Limited	Excellent	Excellent
Esters	Good	Good	Good	Good	Limited	Limited	Limited	Good	Excellent	Excellent
Hydrocarbons-aliphatic	Limited	Limited	Limited	Limited	Excellent	Limited	Limited	Limited	Excellent	Excellent
Hydrocarbons-aromatic	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Excellent	Excellent
Hydrocarbons-halogenated	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Excellent	Excellent
Ketones	Good	Good	Good	Good	Limited	Limited	Limited	Good	Excellent	Excellent
Oils, mineral	Limited	Limited	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Oils, vegetable	Good	Good	Good	Good	Good	Good	Good	Good	Excellent	Excellent
Oxidising agents	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Excellent	Excellent

	LDPE	HDPE	PP	PMP (TPX)	PVC	PC	PS	ACRYLIC (AC)	PTFE	PFA
Max Temp °C	80	120 [†]	135	180	70	130	70	90	300	270
Min Temp °C	-50	-100	-20*	-180	-25	-135	-40	-60	-200	-260
Autoclavable	NO	NO	YES	YES	NO	YES	NO	NO	YES	YES
Gas sterilisation	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Dry Heat sterilisation	NO	NO	NO	YES	NO	NO	NO	NO	YES	YES
Gamma irradiation sterilisation	YES	YES	NO	YES	NO	YES	NO	YES	YES	YES
Chemical Disinfectant sterilisation	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES
Transparency	TL	TL	TL	C	C	C	C	C	O	TL
Flexibility	F	R	R	R	R	R	R	R	R	F
Gas Permeability N ₂	20	3	4.4	65	0.4	3	3	-	-	-
Gas Permeability CO ₂	280	45	92	-	10.2	85	75	-	-	-
Gas Permeability O ₂	60	10	28	270	1.2	20	15	-	-	-
Water Absorbion %	<0.01	<0.01	<0.02	<0.01	0.06	0.35	0.05	0.3	0.3	<0.03
Resistivity Ohm CM ²	>10 ¹⁵	>10 ¹⁵	>10 ¹⁶	>10 ¹⁶	<10 ¹⁶	2x10 ¹⁶	>10 ¹⁶	>10 ¹⁴	>10 ¹⁸	10 ¹⁸
Specific gravity	0.92	0.95	0.90	0.83	1.34	1.20	1.05	1.18	2.2	2.16

mm cm³/cm² sec (cm Hg) x 10¹⁰

[†]Please note that the polymer may become malleable at temperatures above 80°C if the product is under structural stress.

*Warning. Material may become brittle at low temperatures

Use and Care of Plastics

Chemicals can affect the strength, flexibility, appearance, dimensions and weight of plastics depending on



length of exposure
the temperature ...

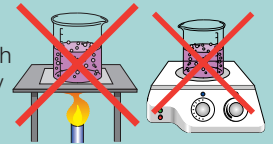


... the concentration.



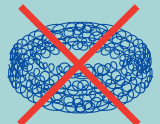
Certain chemicals, i.e. detergents, lubricants, oils, pure water and surface additives in the presence of tensile stress can lead to cracking. Prolonged exposure to strong oxidising agents can also lead to embrittlement and failure.

Never place plastic labware in direct contact with a flame or directly onto a hotplate surface.



Generally, you can clean most plastic labware with laboratory detergent and rinse with distilled water.

Avoid using scourers or abrasive cleaners that scratch the plastic.













Particular care should be taken to avoid the use of strong alkali cleaners with polycarbonate. In the case of stains, oils, greases or other agents which cannot be removed by conventional washing you can adopt the following measures with care:

- Soaking in chromic acid solution will loosen organic particles.
- Bleaches (such as sodium hypochlorite if used at 20°C - 25°C will also assist in the cleaning of organically stained plastic labware. Not suitable for use with polycarbonate.
- Methylene chloride and acetone will help remove oils, however prolonged exposure to such organic solvents can cause swelling of certain plastics. In general do not use solvents with polycarbonate, PVC, acrylic or polystyrene.

For more detailed information on cleaning procedures contact our technical dept.

Chemical Resistance and Physical Properties

These codes are used in the following charts.

 Excellent resistance, no attack.	 Good resistance, minor attack.	 Limited resistance, moderate attack, suitable for short term use only.
 Poor resistance, not recommended.	 No information available.	
Transparency		Flexibility
 Clear	 Translucent	 Opaque
	 Excellent	 Rigid

	LDPE	HDPE	PP	PS	ACRYLIC	PTFE	PMP	PVC	PC	PFA
Acids - dilute										
Acids - concentrated										
Alcohols										
Aldehydes										
Bases										
Esters										
Hydrocarbons Aliphatic										
Hydrocarbons Aromatics										
Hydrocarbons Halogenated										
Ketones										
Oils, Minerals										
Oil, Vegetable										
Oxidizing Agents										
Max Temp. °C	80	120	135	70	90	300	180	70	130	270
Min Temp. °C	-50	-100	0	-40	-60	-200	-180	-25	-135	-260
Autoclavable	NO	NO	YES	NO	NO	YES	YES	NO	YES	YES
Gas Sterilization	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Dry Heat Sterilization	NO	NO	NO	NO	NO	YES	YES	NO	NO	YES
Gamma Irradiation Sterilization	YES	YES	NO	YES	YES	NO	YES	NO	YES	YES
Chemical Disinfectant Sterilization	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES
Transparency	TL	TL	TL	C	C	O	C	C	C	TL
Flexibility	EX	R	R	R	R	R	R	R	R	F
Gas Permeability N ₂	20	3	4.4	3	-	-	65	0.4	3	-
Gas Permeability CO ₂	280	45	92	75	-	-	-	10.2	85	-
Gas Permeability O ₂	60	10	28	15	-	-	270	1.2	20	-
Water Absorption %	<0.01	<0.01	<0.02	0.05	0.3	0.3	<0.01	0.06	0.35	<0.03
Resistivity Ohm CM ²	>10 ¹⁵	>10 ¹⁵	>10 ¹⁶	>10 ¹⁶	>10 ¹⁴	>10 ¹⁸	>10 ¹⁶	<10 ¹⁶	2x10 ¹⁶	10 ¹⁸
Specific Gravity	0.92	0.95	0.90	1.05	1.18	2.2	0.83	1.34	1.20	2.16

Chemical Resistance A - F

★ Excellent resistance no attack
 ★ Good resistance minor attack
 ★ Limited resistance moderate attack
 ★ Poor resistance, attacked or dissolved, not recommended
 ★ No information available

Reagent	LDPE		HDPE		PP		PMP		PVC		PC		PS		SAN		ABS		ACRYLIC		PTFE		PFA		E-CTFE			
	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50		
Temperature °C	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50	20	50
Temperature °F	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122	68	122
Acetaldehyde	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Acetic Acid	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Acetic Anhydride	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Acetone	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Acetyl Chloride	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ammonium Chloride (10%)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ammonium Hydroxide (28%)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Amyl Acetate	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Aniline	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Aqua Regia	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Benzaldehyde	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Benzene	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Benzoic Acid	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Boric Acid (10%)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Bromine Gas (Dry)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Bromine Water	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Butyl Acetate	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Butyl Alcohol	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Butyric Acid	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Calcium Hydroxide (Saturated)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Carbon Disulphide	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Carbon Tetrachloride	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Chlorine Gas (Dry)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Chlorine Water	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Chloroform	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Citric Acid	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
m-Cresol	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Cyclohexane	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Dibutylphthalate	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
p-Dichlorobenzene	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Diethyl Ether	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Diethylene Glycol	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Dimethyl Formamide	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Dioxane	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ethyl Acetate	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ethyl Alcohol	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ethyl Chloride	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ethylene Chloride	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Ethyl Oxide	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Fluorine Gas (Dry)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Formaldehyde (Formalin)	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Formic Acid	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Fuel Oil	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★

This chart gives general guidelines only on the chemical resistance of plastics. There are many factors which influence chemical resistance - always test for your own application before selecting the appropriate product. If you have any doubts, please contact our Technical Department for advice.

