Physical Properties & Chemical Resistance of Plastics

Key to Summary Icons

These icons provide a quick guide to the chemical resistance of polymers and are included with the descriptions of product where applicable.

Exceptional resistance to almost all laboratory chemicals

Moderate to good resistance to common aqueous laboratory chemicals, but avoid organic solvents and strong acids and bases

Good to excellent chemical resistance across a broad range of common laboratory chemicals

A Autoclavable

NB. Where no icon is shown product is manufactured from several materials; refer to physical properties section for each component's chemical or temperature resistance.

Sterilisation

References to methods of sterilisation are based on the following standards:

Autoclaving: 121ºC, 15psi for 30 minutes. When autoclaving always ensure caps are loosened or removed to prevent accidental implosion. Certain chemicals which have no appreciable effect on resins at room temperature may cause deterioration at autoclaving temperatures unless removed with distilled water beforehand.

Gas: Ethylene oxide formaldehyde

Dry Heat: 160ºC, 120 minutes

Disinfectants: Benzalkonium chloride, formalin, ethanol, etc.

Radiation: gamma irradiation at 2.5 (Mrad) with unstabilized plastic

Polypropylene, PP

A

- Translucent rigid polymer
- Autoclavable
- Max. temp varies according to grade
- Typical uses: beakers, cylinders

High Density Polyethylene, HDPE

- Translucent rigid polymer
- Wide temperature range (-100 to +120ºC)
- Excellent general chemical resistance
- Typical uses: chemical storage bottles

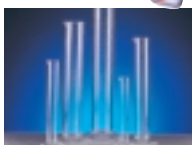
Low Density Polyethylene, LDPE

- Translucent flexible polymer
- Robust and virtually unbreakable
- Typical uses: Wash bottles

Polymethylpentene, PMP(TPX)

A

- Transparent rigid polymer
- Autoclavable
- Wide temperature range (-180 to +180ºC)
- Typical uses: volumetric ware



Polycarbonate, PC

A

- Transparent rigid polymer
- Autoclavable with high impact strength
- Wide temperature range (-135 to +130ºC)
- Typical uses: safety shields

Polystyrene, PS

- Transparent rigid polymer
- Often used for disposable products
- Co-polymers SAN and ABS have improved strength
- Typical uses: containers, medicine spoons

Polyvinylchloride, PVC

- Transparent polymer with low gas permeability
- Has both rigid and flexible forms
- Good resistance to oils
- Typical uses: trays, troughs, tubing

Polymethylmethacrylate, (Acrylic)

- Highly transparent rigid polymer
- Effective barrier to Beta radiation
- Typical uses: radiation shields, burettes

Polytetrafluoroethylene, PTFE

A

- Opaque, incombustable, autoclavable polymer
- Remarkable chemical resistance, temp. range (-200 to +260ºC) and mechanical properties
- Typical uses: beakers, stir bars

Perfluoroalkoxy, PTFE (PFA)

A

- Flexible translucent co-polymer of PTFE
- Autoclavable with extremely low absorption and permeability levels
- Typical uses: handling sensitive biological solutions

Polyurethane, Skinned Foam

- Suitable for use with ice, salt solutions and carbon dioxide
- Excellent insulation properties
- Not suitable for use with liquid nitrogen or solvents

Coated Wire products

A

- Highly chemical-resistant Rilsan® powder coating
- Typical uses: draining racks, bottle carriers

The information contained within this catalogue is offered for use by technically qualified personnel at their discretion and risk. All technical statements, information and recommendations contained herein are based on tests and data we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect hereto. We recommend that users satisfy themselves as to the compatibility between contents and containers or substances and apparatus before use. Dimensions given throughout this catalogue are nominal unless otherwise stated. Bibby Sterilin Ltd reserves the right to alter specifications without notice as part of the company's policy of ongoing product improvement.

CHEMICAL RESISTANCE OF PLASTICS

Excellent resistance - can withstand use over a long period of time without change in physical, optical or chemical properties.

Reagent	LDPE		HDPE		PP		PMP (TPX)		PVC		PC		PS		SAN		ABS		ACRYLIC		PTFE		PFA		E-CTFE	
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
Acetaldehyde	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Acetic Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Acetic Anhydride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Acetone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Acetyl Chloride	●	●	●	●	●	●	○	○	●	●	●	●	●	●	○	○	○	○	○	○	●	●	●	●	●	●
Ammonium Chloride (10%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ammonium Hydroxide (30%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Amyl Acetate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Aniline	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Aqua Regia	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Benzaldehyde	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Benzene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Benzoic Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Boric Acid (10%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Bromine Gas (Dry)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Bromine Water	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	●	●	●	●	●	●	●	●
Butyl Acetate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Butyl Alcohol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Butyric Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Calium Hydroxide (Saturated)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Carbon Disulphide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Carbon Tetrachloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chlorine Gas (Dry)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chlorine Water	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chloroform	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Citric Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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 (90%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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 Azlon product. If you have any doubts, please contact our Technical Dept. for advice.

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.

No information available.

Reagent	LDPE		HDPE		PP		PMP (TPX)		PVC		PC		PS		SAN		ABS		ACRYLIC		PTFE		PFA		E-CTFE	
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
Glycerine (Glycerol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hexane	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrobromic Acid (25%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrochloric Acid (35%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrofluoric Acid (35%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrogen Peroxide (30%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lactic Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methyl Acetate	○	○	○	○	●	●	○	○	●	●	○	○	●	●	●	●	●	●	○	○	●	●	●	●	○	○
Methyl Alcohol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methyl Ethyl Ketone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methylene Chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mineral Oil	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●
Napthalene (crystalline)	●	●	●	●	●	●	○	○	●	●	○	○	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Nitic Acid (10%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nitric Acid (70%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nitrobenxene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oleum	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oxalic Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Perchloric Acid (20%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Petrol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Petroleum Ether	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Phosphoric Acid (85%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Photographic Developer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	●	●	●	●	●	●
Photographic Fixer	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	○	○	●	●	●	●	●	●	●	●
Potassium Hydroxide (50%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Potassium Permanganate (20%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Propylene Glycol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Pyridine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Salicylic Acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Silver Nitrate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium Hydroxide (50%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium Hypochlorite (20%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium Thiosulphate	●	●	●	●	●	●	○	○	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●
Sulphuric Acid (10%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sulphuric Acid (98%)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tetrahydrofuran	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tetrahydronaphthalene	●	●	●	●	●	●	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○
Thionyl Chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	○	○
Toluene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Trichloroethylene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Turpentine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Vegetable Oil	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Xylene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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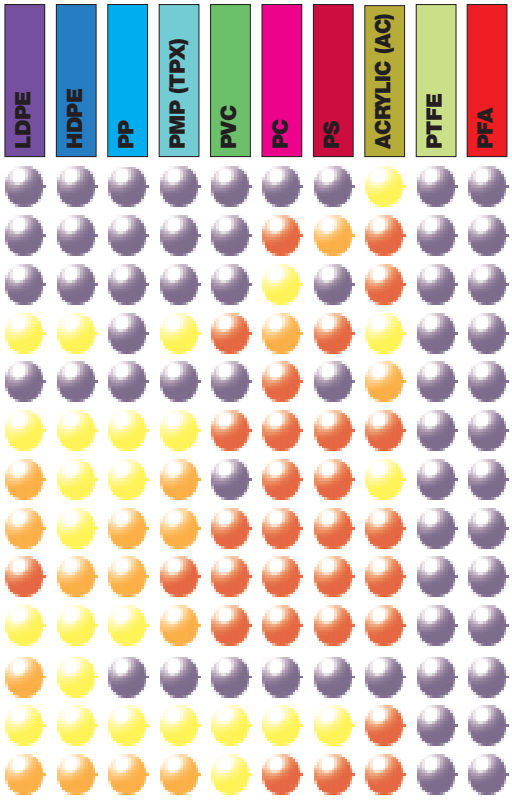


C Clear
O Opaque
TL Translucent
R Rigid
F Flexible

	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 0_2	60	10	28	270	1.2	20	15	-	-	-
Water Absorbtion %	<0.01	<0.01	<0.02	<0.01	0.06	0.35	0.05	0.3	0.3	<0.03
Resistivity Ohm CM²	$>10^{15}$	$>10^{15}$	$>10^{16}$	$>10^{16}$	$<10^{16}$	$2x10^{16}$	$>10^{16}$	$>10^{14}$	$>10^{18}$	10^{18}
Specific gravity	0.92	0.95	0.90	0.83	1.34	1.20	1.05	1.18	2.2	2.16

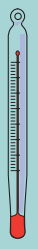
mm cm^3/cm^2 sec (cm Hg) x 10^{10}

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

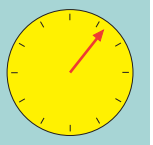
**Warning. Material may become brittle at low temperatures*

Use and Care of Plastics

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

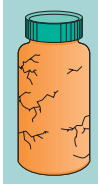


length of exposure ....



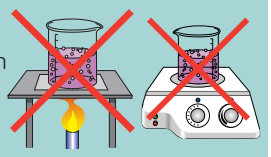
the temperature ...

... the concentration.



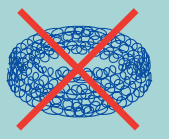
Certain chemicals, i.e. detergents, lubricants, oils, pure water and surface additives in the presence of tensile stress can lead to cracking. Prolonged exposure to strong oxidising agents can also lead to embrittlement and failure.

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:

a. Soaking in chromic acid solution will loosen organic particles.

b. 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.

c. 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.