

Chemical Resistance of Lexan 9030 Polycarbonate Sheet and Lexan Exell D Polycarbonate Sheet

The chemical resistance of Lexan polycarbonate sheet from theplasticshop.co.uk is dependent upon five major factors:

1. Stress level in the application
2. Temperature
3. Exposure time
4. Chemical concentration
5. Type of chemical involved

Lexan polycarbonate sheet has a good chemical resistance, at room temperature, to a variety of dilute organic and inorganic acids. Water, vegetable oils, solutions of neutral salts, aliphatic hydrocarbons and alcohols are also included in this category. When polycarbonate sheet is attacked by a chemical it usually takes one of three forms. In the first case the chemical is absorbed into the plastic, and plasticisation and/or crystallisation occurs. The visible signs of this type of attack are swelling or surface whitening. Lexan polycarbonate is affected in this way by partial solvents such as low molecular weight aldehydes and ethers, ketones, esters, aromatic hydrocarbons and perchlorinated hydrocarbons.

In addition, chemical attack ranging from partial to complete destruction of Lexan polycarbonate occurs in contact with alkalines, alkali salts, amines and high ozone concentrations.

The third type of attack is often the most difficult to predict since environmental conditions dictate whether or not the plastic will be affected. Combinations of certain environments, coupled with stress and/or strain upon the material, cause stress cracking or crazing of the polycarbonate sheet. Crazing can be induced at moderate to high stress levels by low molecular weight hydrocarbons. Products such as acetone and xylene may cause stress cracking even at very low stress levels and should therefore be avoided.

Taking into account the complexity of chemical compatibility, all chemicals which come into contact with polycarbonate sheet from theplasticshop.co.uk should be tested.

On the next page is a more specific list of isolated chemicals.

In case of doubt about any aspect of chemical compatibility of Lexan® polycarbonate sheet supplied by theplasticshop.co.uk please contact us for further advice.

Lexan® sheet chemical class - compatibility summary

<u>Chemical class</u>	<u>Effects</u>
Acids (Mineral)	No effect under most conditions of concentration and temperature
Alcohols	Generally compatible.
Alkalis	Acceptable at low concentration and temperature. Higher concentrations and temperatures result in etching and attack as evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible.
Amines	Surface crystallisation and chemical attack.
Aromatic Hydrocarbons	Solvents and severe stress-cracking agents.
Detergents and Cleaners	Mild soap solutions are compatible. Strongly alkaline ammonia materials should be avoided.
Esters	Cause severe crystallisation. Partial solvents.
Fruit Juices and Soft Drinks	Compatible at low stress levels. Some concentrates not recommended.
Gasoline	Not compatible at elevated temperatures and stress levels.
Greases and Oils	Pure petroleum types generally compatible. Many additives used with them are not, thus materials containing additives should be tested.
Halogenated Hydrocarbons	Solvents and severe stress-cracking agents.
Ketones	Cause severe crystallisation and stress-cracking. Solvents.
Silicone Oils and Greases	Generally compatible up to 80°C.

The table below gives indicative results as to the chemical resistance of polycarbonate sheet against isolated chemicals.

	6 days / 23 °C	6 days / 50 °C	+ = resistant - = non resistant
Acetic acid, 10 % in water	+	+	
Acetone	swells		
Ammonia, 0.1 % in water	-		
Ammonium nitrate, 10 % in water/neutral	+	-	
Benzene	swells		
Benzine - free from aromatic hydrocarbons	+	+	
Butyl acetate	-		
Carbon tetrachloride	swells		
Chloroform	dissolves		
Citric acid, 10 % in water	+		
Dibutyl phthalate	-		
Diethyl ether	-		
Dimethyl formamide	dissolves		
Dioctyl phthalate	-		
Dioxane	dissolves		
Ethanol (pure)	+	+	
Ethyl acetate	swells		
Ethylamine	-		
Ethylene chloride	swells		
Ethylene glycol, 1:1 with water	+	+	
Glycerin	reacts		
Hexane	+	+	
Hydrochloric acid, 10% in water	+	+	
Hydrogen peroxide, 30 % in water	+		
Iron(III) chloride, saturated/aqueous solution	+	+	
Isooctane (2,2,4-trimethyl pentane), pure	+	+ (40 °C)	
Isopropanol - pure	+		
Methanol	-		
Methyl ethyl ketone	swells		
Methylamine	reacts		
Methylene chloride	dissolves		
Nitric acid, 10 % in water	+		
n-propanol	-(30 °C)		
Ozone, 1 % in air	-		
Paraffin, paraffin oil, pure/free from aromatic hydrocarbons	+	+	
Phosphoric acid, 1 % in water	+	-	
Potassium hydroxide, 1 % in water	-		
Propane	+	+	
Silicone oil	+	+	
Sodium carbonate - soda, 10 % in water	+	-(70 °C)	
Sodium chloride, saturated/aqueous solution	+	+	
Sodium hydroxide - caustic soda, 1 % in water	-		
Sodium nitrate, 10 % in water	+		
Styrene	-		
Sulfuric acid, 10 % in water	+	+	
Tetrachloroethane	swells		
Tetrachloroethylene	-		
Trichloroethylene	swells		
Tricresyl phosphate	-		
Triethylene glycol	+	+	
Xylene	swells		

All data given is for guidance only and you should satisfy yourself of material suitability for your chosen application before use.

You can buy polycarbonate sheet online at www.theplasticshop.co.uk

For improved chemical resistance, please consider Lexan Margard MR5e polycarbonate sheet - buy online at www.theplasticshop.co.uk