

Chemical Resistance Comparison of PET and PETG

Application Note

CORNING



PET (polyethylene terephthalate) is a plastic resin consisting of polymerized units of ethylene glycol and terephthalic acid. PET can be copolymerized to create PETG (polyethylene terephthalate glycol-modified) when cyclohexane dimethanol is added to the polymer chain. This addition alters crystallization and lowers the polymer melting temperature, which makes the resin easier to form but affects mechanical and dimensional stability of the finished plastic¹.

Chemical interactions can affect various properties of plastic: mechanical strength, flexibility, surface appearance, color, dimensions, or weight. Inadequate chemical resistance often results in swelling or softening when molecules of the chemical diffuse into the space between polymer chains and push them apart. Chemicals can also cause stress cracks to form, which may propagate further if mechanical stresses increase².

The following general information on the chemical resistance of PET and PETG³ does not guarantee specific properties or performance of plastic bottles or the suitability for a specific application. Many factors can affect chemical resistance including temperature, chemical concentration, exposure periods, and mechanical load. Therefore, compatibility testing should be conducted for each specific usage condition.

Physical Properties of PET and PETG

Property	PET	PETG ³
Maximum Recommended Working and Storage Temperature	50°C (122°F)	70°C (158°F)
Minimum Recommended Working and Storage Temperature*	-40°C (-40°F)	-70°C (-94°F)
Microwavable	No	Marginal
Autoclavable	No	No
Sterilization		
Gas	Yes	Yes
Dry Heat	No	No
Radiation	Yes	Yes
Disinfectants	Some	Some

*Bottle performance in freezers depends on both the temperature and contents in the bottle. It is strongly recommended that a trial run be performed under actual conditions to test the suitability of the bottles for frozen storage.

Key

Chemical Resistance	1	No damage after 30 days of constant exposure; plastic may tolerate for years
	2	Little to no damage after 30 days of constant exposure
	3	Some effect after 7 days of constant exposure (effect may be crazing, cracking, loss of strength, or discoloration)
	4	Not recommended for continuous use; immediate damage may occur (effect will be more severe crazing, cracking, loss of strength, discoloration, deformation, dissolution, or permeation loss)

For liquids commonly used in life science and industrial applications, **PET and PETG have similar chemical resistance:**

Liquids	PET	PETG
Aqueous Solutions	1	1
Media and Sera	1	1

For the following chemical families and types, **PET has more favorable chemical resistance than PETG***:

Acids	PET	PETG
Acids	3	4
Acids (dilute or weak)	1	2
Acids (strong or concentrated)	3	4

Alcohols	PET	PETG
Alcohols	3	3
Alcohols (aliphatic)	1	2
Alcohols (aromatic)	3	4

Aldehydes	PET	PETG
Aldehydes	2	3
Aldehydes (aliphatic)	1	2
Aldehydes (aromatic)	2	4

Amines	PET	PETG
Amines	2	4
Amines (aliphatic)	2	4
Amines (aromatic)	2	4

Esters	PET	PETG
Esters	3	4
Esters (aliphatic)	3	4
Esters (aromatic)	3	3

Ethers	PET	PETG
Ethers	3	4
Ethers (aliphatic)	2	3
Ethers (aromatic)	3	4

Hydrocarbons	PET	PETG
Hydrocarbons	3	4
Hydrocarbons (aliphatic)	3	2
Hydrocarbons (aromatic)	3	4
Hydrocarbons (halogenated)	3	4

*With the exception of aliphatic hydrocarbons, in which PETG has more favorable chemical resistance.

For the following chemical families and types, **PET has more favorable chemical resistance than PETG** (continued):

Ketones	PET	PETG
Ketones	2	4
Ketones (aliphatic)	2	4
Ketones (aromatic)	2	4
Other	PET	PETG
Oils and Greases	2	3
Dry Salts	1	2

PET and PETG have similar chemical resistance for the following chemical families and types:

Bases	PET	PETG
Bases/Alkali (inorganic)	4	4
Bases/Alkali (inorganic, dilute, or weak)	4	4
Bases/Alkali (inorganic, strong, or concentrated)	3	3

For some chemical families and types, **PET has less favorable chemical resistance than PETG***:

Oxidizing Agents	PET	PETG
Oxidizing Agents	4	3
Oxidizing Agents (strong or concentrated)	4	3
Oxidizing Agents (dilute or weak)	3	3

*With the exception of dilute or weak oxidizing agents, in which case the chemical resistance is similar.

Other	PET	PETG
Detergents/Surfactants	2	1

References

1. NPCS Board of Consultants & Engineers (2014) Disposable Products Manufacturing Handbook, NIIR Project Consultancy Services, Delhi, ISBN 978-9-381-03932-8.
2. Evaluating the Resistance of Plastics to Chemical Reagents ASTM D543.
3. Data from Thermo Fisher Scientific.

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