

Binders for Ceramic Processing

Overview & Benefits Summary

QPAC®25 & QPAC®40

Product Overview:

Poly(alkylene carbonates) are synthesized through the polymerization of carbon dioxide and epoxides. The products of their combustion are carbon dioxide and water vapor, which are non-toxic, non-flammable, and environmentally safe. They burn cleanly in any environment, oxidizing or inert. They are colorless, amorphous thermoplastic polymers with low glass transition temperatures.



QPAC offers exceptional green strength for ceramic parts

Poly(alkylene carbonates) are ideally used as binders for ceramics processing, including injection molding and press and sinter operations. Here's why:

- Decomposition is complete through three phases: solid, liquid, and vapor.
- QPAC decomposes completely between 220°C - 250°C, which can be as much as 150°C below the decomposition temperatures of other binders.
- Upon decomposition, QPAC leaves very low ash residue with the complete burn-out of carbon.
- QPAC is soluble in many common solvents. It is not water soluble, allowing for use with AlN powders.
- QPAC is available as powder, granulate, pellet, solution, and water based emulsion.
- The use of QPAC as binders allows for parts with excellent green strength.
- QPAC has excellent film-forming and coating capabilities.

Properties of QPAC formulations:

QPAC® 25 - PEC - poly(ethylene carbonate)

Density	1.42
Chemical formula	$[\text{CH}_2\text{CH}_2\text{OCO}_2]_n$ or $\text{C}_3\text{H}_4\text{O}_3$
Tensile strength	500 - 1,500 psi
Solubility	Methylene chloride, Chloroform, & 1,2-Dichloroethane
Tg	25°C

QPAC® 40 - PPC - poly(propylene carbonate)

Density	1.26
Chemical formula	$[\text{CH}_3\text{CHCH}_2\text{OCO}_2]_n$ or $\text{C}_4\text{H}_6\text{O}_3$
Tensile strength	5,000 - 6,000 psi
Solubility	Methylene chloride, MEK, Acetone & Propylene carbonate
Tg	40°C

Other QPAC Binder Applications:

- High Energy Capacitor Processing
- Thick Film Inks
- Brazing Solutions and Pastes
- Diamond Cutting Tool Manufacturing
- Ceramic Fiber Processing
- Die attach adhesives

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