STARPC OC PVP-Based Multifunctional Polymers

Whitening, Stability and Performance Across Multiple Oral Care Dosage Forms

Whitening Booster
Stain Remover
Film Former / Pigment Barrier
Solubilizer
Stabilizer
Adhesive / Fixative
Tableting Excipients

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STARPC® PVP-Based Polymers - Multifunctional Whitening Enhancers

STARPC Polyvinylpyrrolidone (PVP) K OC grades and **Vinylpyrrolidone–Vinyl Acetate Copolymers (PVP/VA)** are key functional polymers widely used in modern oral care formulations, particularly in whitening applications. Thanks to their excellent film-forming, stabilizing, and solubilizing capabilities, they play an essential role in the performance of multiple dosage forms, including:

- Toothpastes
- Whitening Mouthwashes
- Whitening Strips
- Dry-mouth Formulations
- Denture or Aligner Cleaning Systems

Their unique molecular characteristics enable:

- The formation of clear whitening films on tooth surfaces
- Interaction with chromogenic pigments to support stain removal
- Stabilization and improved delivery of whitening actives such as PAP or peroxides
- Enhanced texture, clarity, and overall performance in oral care formulations

PVP K
Polyvinylpyrrolidone
Povidone

CAS No.: 9003-39-8

PVP/VA
PVP/VA Copolymer
Copovidone

CAS No.: 25086-89-9

PVPP
Polyvinylpolypyrrolidone
Crospovidone

CAS No.: 25249-54-1

What Are the Main Functionalities?

STARPC PVP K OC grades and **PVP/VA OC Copolymers** combine multiple functional mechanisms that are particularly beneficial in whitening formulations.

Their performance is driven by three key mechanisms:

1. Film Formation

STARPC OC polymers form uniform, clear film layers on the tooth surface. These films:

- Reduce surface roughness
- Enhance light reflection, leading to instant optical whitening
- Facilitate stain removal
- Provide longer-lasting protection against new discoloration

Polymer-specific effects:

- **STARPC PVP K OC** grades are highly water-soluble and form clear, smooth, glossy films upon drying
- **STARPC PVP/VA OC** is a partially hydrophobic copolymer that forms flexible, durable films with improved adhesion and substantivity

2. Pigment Interaction and Stain Removal

STARPC PVP K OC contains a lactam ring that forms hydrogen bonds with polyphenolic pigments from tea, coffee and red wine. By binding chromogenic molecules in solution, it:

- Facilitates pigment detachment
- Enhances stain-release performance
- Reduces redeposition on enamel and the salivary pellicle effective in whitening toothpastes and mouthwashes.

STARPC PVPP OC, containing the same lactam functionality, acts as an insoluble adsorbent with a large surface area:

- Binds polyphenolic pigments onto its polymer matrix
- Supports stain removal by physical adsorption

3. Stabilization of Whitening Actives

PVP is a well-known solubilizer and stabilizer for peroxide-based and non-peroxide whitening agents such as PAP.

Its key functions include:

- Improving solubility of oxidizing agents, flavors, and essential oils
- Preventing crystallization and phase separation
- Enabling homogeneous distribution in gels, mouthwashes, and whitening strips

STARPC PVP/VA OC additionally stabilizes hydrophobic components due to the presence of vinyl acetate units, improving compatibility and long-term stability.

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pvp-chem-agency.com/products/sample-request-form

Regulatory:

STARPC OC PVP K, **PVP/VA** and **PVPP** comply with major pharmacopeias (USP/NF, EP, JP) and key food regulations, with PVP and PVPP recognized as FDA GRAS.

STARPC OC and STARCLEAR PVPP Application Benefits

Applications	Products	Functional Benefits	Typical Dosage	Comments
Whitening Toothpastes	**STARPC K30P OC** **STARPC VA64P OC**	Film former for surface brightening Stain-release enhancement Stabilizes peroxide whitening systems Supports smooth texture and application	1 – 5%	**STARPC K30P OC** provides clear, smooth films enabling optical whitening. **STARPC VA64P OC** forms more flexible, hydrophobic films with longer-lasting adhesion.
Dry Mouth (Xerostomia) · Toothpastes · Other Formulations	**STARPC K30P OC**	Moisture retention and humectancy Improved lubrication Enhanced sensory profile	0.5 – 3%	**STARPC K30P OC** is hydrophilic and improves mouthfeel. It increases moisture availability for patients with dry mouth.
Whitening Mouthwash	**STARPC K30P OC** **STARPC VA64P OC**	Formation of thin whitening films Solubilization of flavors and oils Stain prevention	0.1 – 1%	**STARPC K30P OC** acts as a solubilizer (dissolves mint oils and flavors), a colloid stabilizer (prevents precipitation), and a viscosity stabilizer (maintains homogeneous formulations), ensuring clear, transparent mouthwash formulations. * **STARPC VA64P OC** is slightly more hydrophobic and forms more flexible and durable films, creating a smooth, polished, residue-free surface that reduces re-soiling and supports a stain-resistant finish.
Multipurpose Mouthwash	**STARPC K30P OC** **STARPC VA64P OC**	Solubilizer Stabilizer for essential oils Light viscosity modification	0.05 - 0.5%	Improves clarity and homogeneity of mouthwash formulations.
Whitening Strips	**STARPC K90P OC** **STARPC VA64P OC**	Matrix binder for strip gels Strong adhesion to enamel Flexible film formation	5 – 20%	**STARPC K90P OC** provides strong viscosity and adhesion. **STARPC VA64P OC** enables more flexible films.
Effervescent Cleaning Tablets · Denture · Aligners · Mouthguards	**STARPC K30P OC** **STARPC PVPP OC**	Binder for tablet strength Superdisintegrant (PVPP)	**PVP** 3 – 10% **PVPP** 2 – 5%	**STARPC K30P OC** ia a water soluble tablet binder for robust tablets. **STARPC PVPP OC** efficiently combines three disintegration mechanisms: swelling, wicking, and shape recovery.
Dental Floss (coated)	**STARPC K30P OC**	Carrier for flavors Smooth, uniform coating Improved glide properties	1 – 5%	Provides smooth coating, improved handling and enhanced flavor release.
Retainer and Mouthguard · Cleaner · Liquids · Foams	**STARPC K30P OC** **STARPC VA64P OC**	Stabilization Film formation Solvent compatibility Solubilization of hydrophobic components Colloidal and viscosity stabilization	0.5 – 3%	**STARPC K30P OC** forms thin films on aligners and retainers, resulting in smoother surfaces with reduced adhesion of biofilm, stains, and odors, maintained optical clarity, and easier subsequent cleaning. For solubilization, stabilization, and film formation, see Whitening Mouthwash above. *

Product Range

PVP K Series - Polyvinylpyrrolidone – Povidone - INCI Name: PVP		
STARPC	K30P OC	• Balanced molecular weight • Ideal for toothpaste and mouthwash • Excellent solubilization and film formation
STARPC	K90P OC	• Very high molecular weight • Strong adhesion and viscosity • Preferred for whitening strips and leave-on products
PVP/VA - Vinylpyrrolidone/Vinyl Acetate Copolymer - Copovidone - INCI Name: VP/VA Copolymer		
STARPC	VA64P OC	• Flexible, hydrophobic films • Long-lasting adhesion • Improved compatibility with hydrophobic actives
PVPP - Polyvinylpolypyrrolidone - Crospovidone - Crosslinked PVP		
STARPC	PVPP OC	• Insoluble superdisintegrant with rapid swelling • Polyphenol adsorbent with large surface area

Functionality-Relevant Characteristics

STARPC OC PVP, PVP/VA and PVPP provide complementary benefits for modern oral care formulations and dosage forms.

	STARPC PVP K OC	STARPC PVP/VA OC	STARPC PVPP OC
Water Solubility	Fully soluble → clear mouthwash, gels	Partially soluble → flexible films	Insoluble → tablet applications
Key Function	Film formation, solubilization, stabilization	Flexible, durable film formation	Superdisintegrant / stain adsorbent
Adhesion	Good adhesion to teeth → stain-release films	Enhanced adhesion to plastic surfaces → aligners/retainers	N/A
Gloss / Whitening	Natural shine → optical whitening	High gloss → whitening strips	N/A
Moisture Interaction	Absorbs water → humectancy in toothpaste	Mild moisture resistance → stable in liquids	Swells rapidly → fast tablet breakup
Ideal Uses	Toothpaste, mouthwash, whitening gels	Whitening strips, aligner cleaners	Retainer/denture cleaning tablets

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