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AQUALON[®]

Sodium Carboxymethylcellulose

Physical and Chemical Properties

HERCULES

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AQUALON® CMC

An Anionic Water-Soluble Polymer

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AQUALON® CMC AN ANIONIC WATER-SOLUBLE POLYMER

Aqualon[®] sodium carboxymethylcellulose (CMC) has a minimum purity of 99.5%. An anionic water-soluble polymer derived from cellulose, it has the following functions and properties:

- It acts as a thickener, binder, stabilizer, protective colloid, suspending agent, and rheology, or flow control agent.
- It forms films that are resistant to oils, greases, and organic solvents.
- It dissolves rapidly in cold or hot water.
- It is suitable for use in food systems.
- It is physiologically inert.

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• It is an anionic polyelectrolyte.

These properties and functions make it suitable for use in a broad range of applications in the food, pharmaceutical, cosmetic, paper, and other industries. To serve these diverse industries, the polymer is available in three grades: food, pharmaceutical, and standard, and in many types based on carboxymethyl substitution, viscosity, particle size, and other parameters.

This booklet describes basic chemical and physical properties of Aqualon CMC in all its forms. The wide variety of types produced and the typical uses for this versatile polymer are also discussed. The contents page will guide the reader to subjects of special interest.

Technical or semi-refined grades of sodium carboxymethylcellulose are also available and are described in Booklet 250-3, available from Aqualon by request.

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APPLICATIONS

Since its commercial introduction in the United States by Hercules Incorporated in 1946, sodium carboxymethylcellulose has found use in an ever-increasing number of applications. The many important functions provided by this polymer make it a preferred thickener, suspending aid, stabilizer, binder, and film-former in a wide variety of uses.

The wide range of viscosity and substitution types available from Aqualon for the highly purified grades and the less highly purified technical grades of CMC continues to expand the uses for this product line. A representative listing of the many applications for sodium carboxymethylcellulose is given below and on the following page. Many of these applications do not require the use of the highly purified grade, and a *technical* grade of CMC is available for certain applications. Aqualon's chemists and engineers continue to tailor-make various grades and types to meet the needs of specific customers and industries requiring water-soluble polymers.

Types of Uses	Specific Applications	Properties Utilized
Cosmetics	Toothpaste	Thickener; flavor stabilizer; suspending aid; binder
	Shampoos; foamed products	Suspending aid; thickener; foam stabilizer; high water-binding capacity
	Creams; lotions	Emulsion stabilizer; film-former; thickener
	Gelled products	Thickener; gelling agent; film-former
	Denture adhesives	Wet tack; long-lasting adhesion
Foods	Frozen desserts; soft-serve	Controls ice crystal growth; improves mouthfeel, body, and texture
	Pet food	Water binder; gravy thickener; extrusion aid; binder of fines
	Protein foods	Retains water; improves mouthfeel
	Baked goods	Batter viscosifier; improves moisture retention and texture
	Beverages	Suspending aid; rapid viscosifier; improves mouthfeel and body; protein stabilizer in acidified drinks
	Desserts; icings; toppings	Odorless and tasteless; thickens; controls sugar crystal size; improves texture; inhibits syneresis
	Low-calorie foods	No caloric value ⁽²⁾ ; thickens; imparts body and mouthfee
	Syrups	Clear; thickens; imparts favorable mouthfeel and body
	Dressings; sauces	Thickener and suspending aid; imparts mouthfeel
	Animal feed; extrusion products	Lubricant; binder; film-former
Pharmaceuticals	Ointments; creams; lotions	Stabilizer; thickener; film-former
	Jellies; salves	Thickener; gelling agent; protective colloid, film-former
	Tablet binder; granulation aid	High-strength binder
	Bulk laxatives	Physiologically inert; high water-binding capacity
	Syrups	Thickener
	Suspensions	Thickener; suspending aid

APPLICATIONS FOR PURIFIED CMC⁽¹⁾

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⁽¹⁾For these applications, food grades (designated "F") or pharmaceutical grades (designated "PH") are used.

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APPLICATIONS FOR STANDARD GRADE OF CIVIC	APPLICATIONS	FOR	STANDARD	GRADE	OF	CMC
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Types of Uses	Specific Applications	Properties Utilized
Adhesives	Wallpaper paste	Water-binding aid; adhesion; good open time; nonstaining
	Starch-corrugating adhesive	Thickener; water-binding and -suspending aid
	Latex adhesives	Thickener; water-binding aid
Aerial-drop fluids	Insecticides	Thickener; binder; suspending aid
	Drift-control agent	Thickener
Ceramics	Glazes Porcelain slips Vitreous enamels Refractory mortars	Binder for green strength; thickener; suspending aid
	Welding rod coatings	Binder; thickener; lubricant
Coatings	Foundry core wash	Binder; thickener; suspending aid
	Latex paints; paper coatings	Rheology control; suspending aid; protective colloid
Detergents	Laundry	Whiteness retention through soil suspension
Lithography	Fountain and gumming solutions	Hydrophilic protective film
	Water-based inks	Binder; rheology control; suspending aid
Paper and paper products	Internal addition	High-strength binder; improves dry strength of paper
	Surface addition	High-strength binder; oil-resistant film-former; provides control of curl and porosity and resistance to oils and greases
	Pigmented coatings	Thickener; rheology control; water-retention aid
Textiles	Laundry and fabric sizes	Film-former
	Latex adhesives; backing compounds Printing pastes and dyes	Rheology control; thickener; water binding and holdout
	Warp sizing	High film strength; good adhesion to fiber; low BOD value
Tobacco	Cigar and cigarette adhesive	Good wet tack; high film strength
	Reconstituted sheet	High-strength binder and suspending aid

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