



BULLETIN VC-5653-3 (supersedes 5653-2)

# klucel™ hydroxypropylcellulose (HPC)

multi-functional, cellulose-derived rheology modifiers

## formulator benefits

- o derived from sustainable wood<sup>1</sup> and cotton
  - 39% natural origin content<sup>2</sup>
  - cotton linters are 100% recycled content<sup>3</sup>
- o non-ionic thickener, compatible with a broad range of formulation ingredients including many surfactants and other rheology modifiers
- o multi-functional ingredient, providing thickening, stabilizing and film forming benefits
- o capable of thickening anhydrous and low water systems, including glycerol, propylene glycol, and polyethylene glycol-based formulations

## formulation benefits

- o thickens and structures formulas, enhancing sensorial experience
- o delivers soft hold and anti-frizz benefits from hair styling applications.
- o increases curl retention and flexibility when used in conjunction with firm hold fixatives
- o compatible with ethanol and isopropanol for use in hand-sanitizer applications
- o enhances foam volume and stability

<sup>1</sup> suppliers have made commitments to utilize standards set by the Forest Stewardship Council (FSC) and/or Program for the Endorsement of Forest Certification (PEFC).

<sup>2</sup> according to ISO 16128-2:2017

<sup>3</sup> suppliers have received third party certifications including the Global Recycled Standard (GRS 4.0) and SCS Recycled Content Standard, certifying that their cotton linters are 100% recycled content.

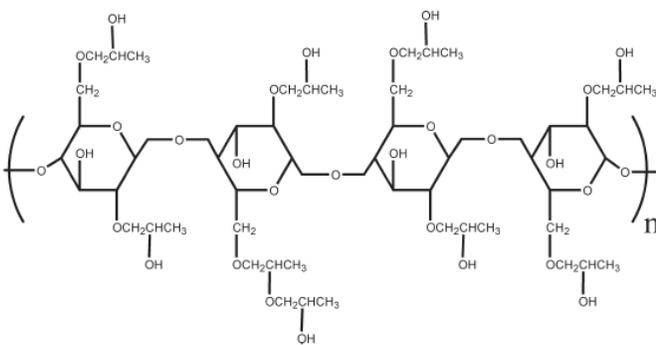
## applications

shampoos, body washes, mousses, hair styling gels, hand sanitizers, shave gel and foams, sun care gels, AP/DEO products, sprayable hair styling fixatives, color cosmetics

**product forms** gels, liquids

**available formulations from Ashland** shampoos, hand sanitizers

## chemistry



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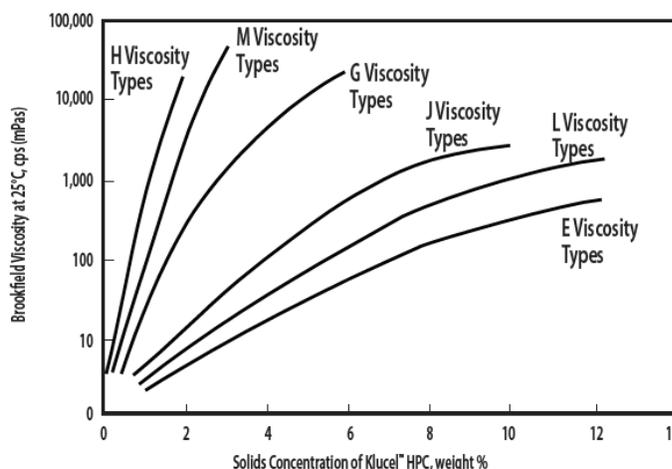
INCI name: Hydroxypropylcellulose

**typical properties**

appearance..... white to off-white powder  
 moisture content......5% (max)  
 bulk density (g/ml).....0.5 (varies by type)  
 solubility:  
     water..... clear, smooth solutions  
     ethanol..... clear, smooth solutions  
     isopropanol.....clear to slightly hazy solutions  
     organic solvents.....soluble in many polar organic solvents  
     propylene glycol.....clear solutions, requires heat to 90 °C  
 solution properties:  
     pH (1% aqueous solution)..... 5-8  
     surface tension, 0.1%, 20°C .....~43 mN/m  
     viscosity.....see figures below for guidance on viscosity ranges for various Klucel™  
     hydroxypropylcellulose types

Klucel	% Solution	Water Viscosity Range, cps	Ethanol Viscosity Range, cps	Average Molecular Weight
HCS	1	1,500-3,000	1,000-4,000	1150K
MCS	2	4,000-6,500	3,000-6,500	850K
GCS	2	150-400	75-400	370K
JCS	5	150-400	75-400	140K
LCS	5	75-150	25-150	95K
ECS	10	200-600	150-700	80K

viscosity ranges in water and ethanol for various Klucel™ hydroxypropylcellulose types



effect of concentration and type on aqueous solution viscosity

**formulation guidelines**

<b>recommended use levels</b>	0.5-2%
<b>temperature/mixing conditions</b>	<p>Pre-slurry in hot water, or other nonsolvent, prior to addition to main batch volume (preferred)</p> <ol style="list-style-type: none"> <li>1. Disperse polymer powder in well agitated 50-60 °C water at a weight ratio of 1 part Klucel™ HPC :6 parts liquid.</li> <li>2. Continue to agitate the slurry at temperature for several minutes to fully disperse and presoak the polymer particles.</li> <li>3. Gradually add dispersion to the remaining, room temperature batch volume.</li> <li>4. Continue stirring until polymer particles are fully dissolved and batch is free of any gel.</li> </ol>

	<p>Dissolution in room temperature water</p> <ol style="list-style-type: none"> <li>1. Slowly add polymer powder to the vortex of well agitated water. Polymer should be added slowly enough that particles can separate to avoid gel formation but fast enough that dissolution can occur before significant viscosity has built.</li> <li>2. Continue agitation until polymer particles are fully dissolved and solution is free from any gel that may have formed.</li> </ol> <p>Dissolution in polar organic solvents</p> <ol style="list-style-type: none"> <li>1. Slowly add polymer to well agitated heated or room temperature solvent. Unlike in water, elevated temperature will improve dissolution in organic solvents. Note: elevated temperature is not advised for highly volatile solvents.</li> <li>2. Continue agitation until polymer particles are fully dissolved and solution is smooth and gel-free.</li> </ol> <p>Dissolution in hydro-alcoholic solutions</p> <ol style="list-style-type: none"> <li>1. Slowly add polymer to well agitated alcohol phase and allow to stir for 10 minutes to fully disperse.</li> <li>2. Add water to the slurry and continue stirring for 45 minutes until viscosity develops and no polymer particles can be observed.</li> </ol>
<b>when to add</b>	Polymer is ideally added at the beginning of the formulation to ensure that the polymer is completely hydrated before adding additional ingredients.
<b>tips from Ashland's solvers</b>	polymer is stable in formulation pH between 4-10 no neutralization required for thickening benefits

## safety, handling, and storage

It is recommended to use the product in rotation on a first-in first-out basis. The product should be stored under dry and clean conditions in its original packing and away from heat. The product is hygroscopic. The packaging is selected in a way to avoid ingress of moisture, but the water content of the packed product will/may increase if not stored properly.

Additional information concerning safety, handling and storage is supplied in the safety data sheet, which can be made available upon request. Such information includes:

- o classification and labelling per regulation for transport and for dangerous substances
- o protective measures for storage and handling

A toxicology summary can also be made available, on a confidential basis, by contacting your local Ashland representative.

## regulatory

CAS#: 9004-64-2

Component ingredients are listed in the China IECIC-2015

Other regulatory information is available on request.