

# benecel™ mx 100 methylcellulose

## methylcellulose for meat alternatives

### description

The growing popularity of plant-based alternatives has spurred innovation in end applications, ingredients, and textures. Consumers have come to expect a similar eating experience to meat-based products; therefore, plant-based alternatives must mimic the texture of meat-based products.

## key features and benefits

### strong thermal gelling

- a meat-like texture and appearance

### low gelling temperature

- stability during cooking
- firm meat-like texture at eating temperature

### very high viscosity

- product stability across temperature range
- firmer emulsion versus lower viscosity grades of methylcellulose
- retains shape of final product
- retains moisture

### improved processing

- provides very high viscosity quickly to aid in high-speed processing
- easy hydration for a very high viscosity grade

### molecular structure is both hydrophilic and hydrophobic

- creates solid fat texture with liquid oil and water
- stabilizes fat and water to retain moisture
- aids in fatty meat-like structure

### plant-derived

- vegetarian and vegan suitable
- non-allergenic
- eliminates need for eggs

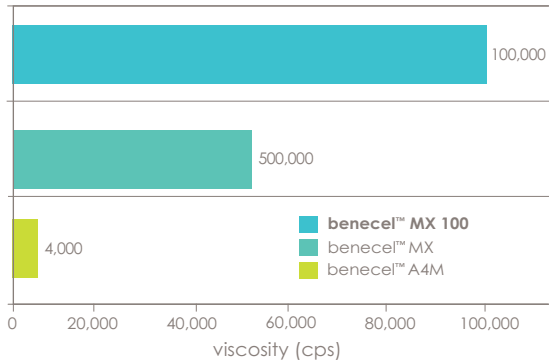


Benecel™ MX 100 methylcellulose is specially formulated for meat alternatives and other vegetable-based applications such as vegan chicken and seafood. During cooking, benecel™ MX 100 methylcellulose creates a gel that provides a firm meat-like texture even as the product cools to eating temperatures. Benecel™ MX 100 methylcellulose is suitable for large-scale, high-speed processing that's required for high-volume production of plant-based alternatives.

## viscosity

Benece™ MX 100 methylcellulose has the highest viscosity of all Ashland methylcellulose grades. Viscosity contributes to the texture of plant-based alternatives. The very high viscosity of benece™ MX 100 creates a firmer texture at cold and room temperatures (0–20°C).

figure 1: viscosity of benece™ methylcellulose grades

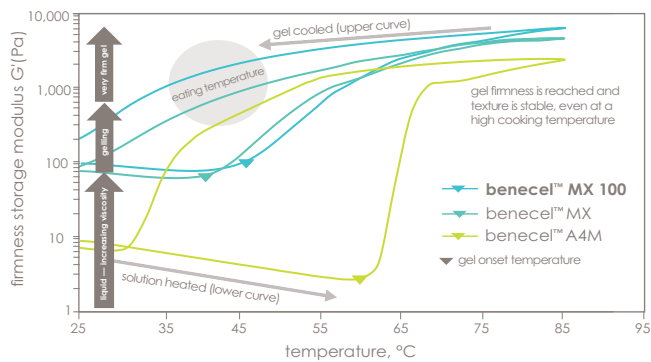


<sup>1</sup> Viscosity data was measured for 2% solutions at 20°C using a Brookfield LV viscometer, spindle 4, at 3 rpm.

## thermal gelation

Thermal gelation is a unique property of methylcellulose and it provides structure and texture to plant-based meat alternative formulations. The graph shows thermal gelation of 2% benece™ methylcellulose solutions. As the solution is heated, the viscosity increases, and the solutions begin to gel. As the solutions cool, the viscosity reverts to its initial value. The gel onset temperature for benece™ MX 100 methylcellulose is 35 to 45°C.

figure 2: thermal gelation of methylcellulose grades

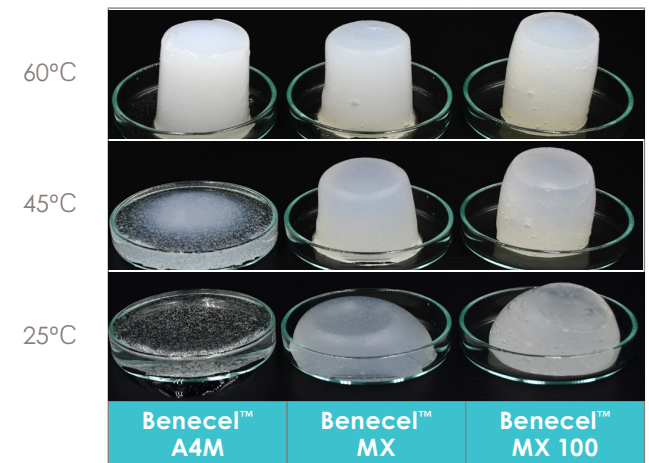
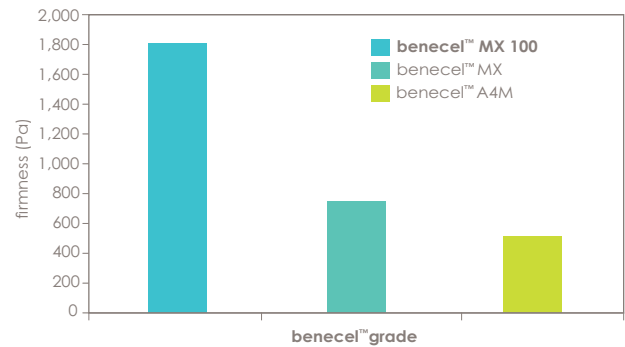


<sup>2</sup> data was obtained for 2% solutions using a Discovery Hybrid Rheometer (DHR-3) with Peltier concentric cylinder stage from TA Instruments, New Castle, Delaware USA

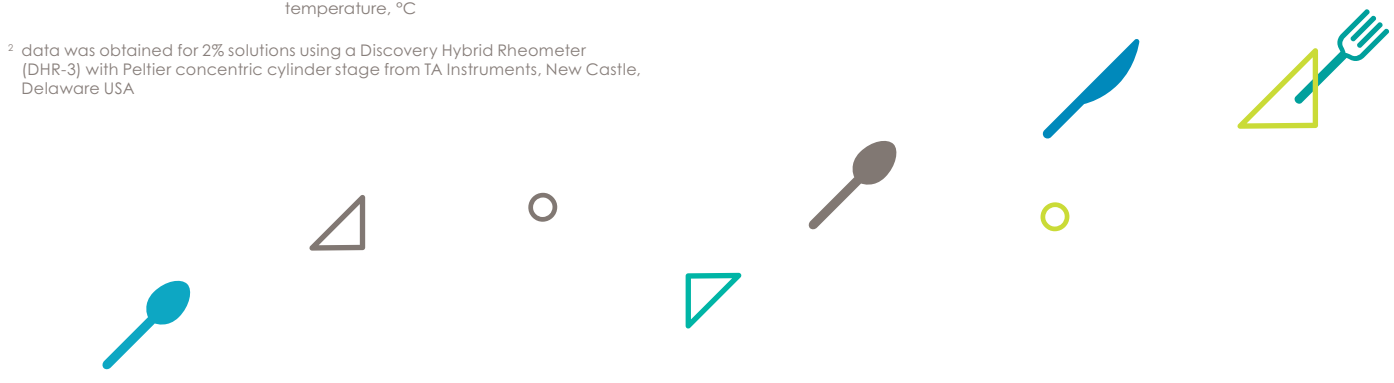
## gel firmness

Gel firmness is an indication of the level of firmness a hydrocolloid can contribute to a meat alternative product. The graph shows gel firmness at eating temperature for benece™ methylcellulose products. Methylcellulose gels during the cooking process and maintains gel firmness as the product cools allowing 'bite' integrity at comfortable eating temperatures (35–45°C). Benece™ MX 100 methylcellulose maintains highest gel firmness at eating temperature.

figure 3: gel firmness at eating temperature



Benece™ MX 100 methylcellulose gel maintains its structure as it cools from 60°C to 25°C. From cooking to cooling, benece™ MX 100 provides structure and texture to alternative protein products.



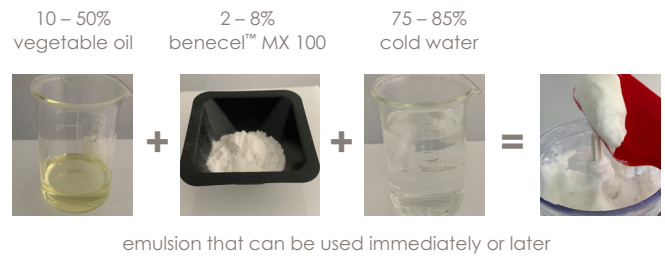
## how to use

### emulsion method

Benece<sup>™</sup> MX 100 methylcellulose can replicate a solid fat using liquid oils. When blended with liquid vegetable oils and cold water under high shear, an opaque, solid emulsion is formed. This solid fat-like emulsion mimics the appearance and texture of animal fat in an ideal way in plant-based alternatives, thus facilitating formulation and cost flexibility.

This method is primarily used with high viscosity methylcellulose grades that provide superior texture and stability to oil-in-water emulsions

### figure 4: emulsion method



### direct addition

Simply blend benece<sup>™</sup> MX 100 methylcellulose with other dry ingredients before adding water.

Both the emulsion and direct addition methods are effective at incorporating benece<sup>™</sup> MX 100 methylcellulose into a formulation.

## formulation examples

### emulsion method



120 g patty, frozen overnight, fried in a table grill (Tefal Opti Grill) until well-done (core temp. ca. 65°C).

**note:** Control does not contain methylcellulose.

### direct addition



120 g patty, frozen overnight, fried in a table grill (Tefal Opti Grill) until well-done (core temp. ca. 65°C).

**note:** Control does not contain methylcellulose.

components	amount (%)
soaked TVP / Soy (1:3)	40
isolated pea protein	4
isolated soy protein	8
salt	1.8
color	0.3
spice	2
dextrose	3.9
emulsion:	40
[canola (rapeseed) oil]	[20]
[benece <sup>™</sup> MX 100 methylcellulose]	[4]
[ice water]	[76]
<b>total</b>	<b>100</b>

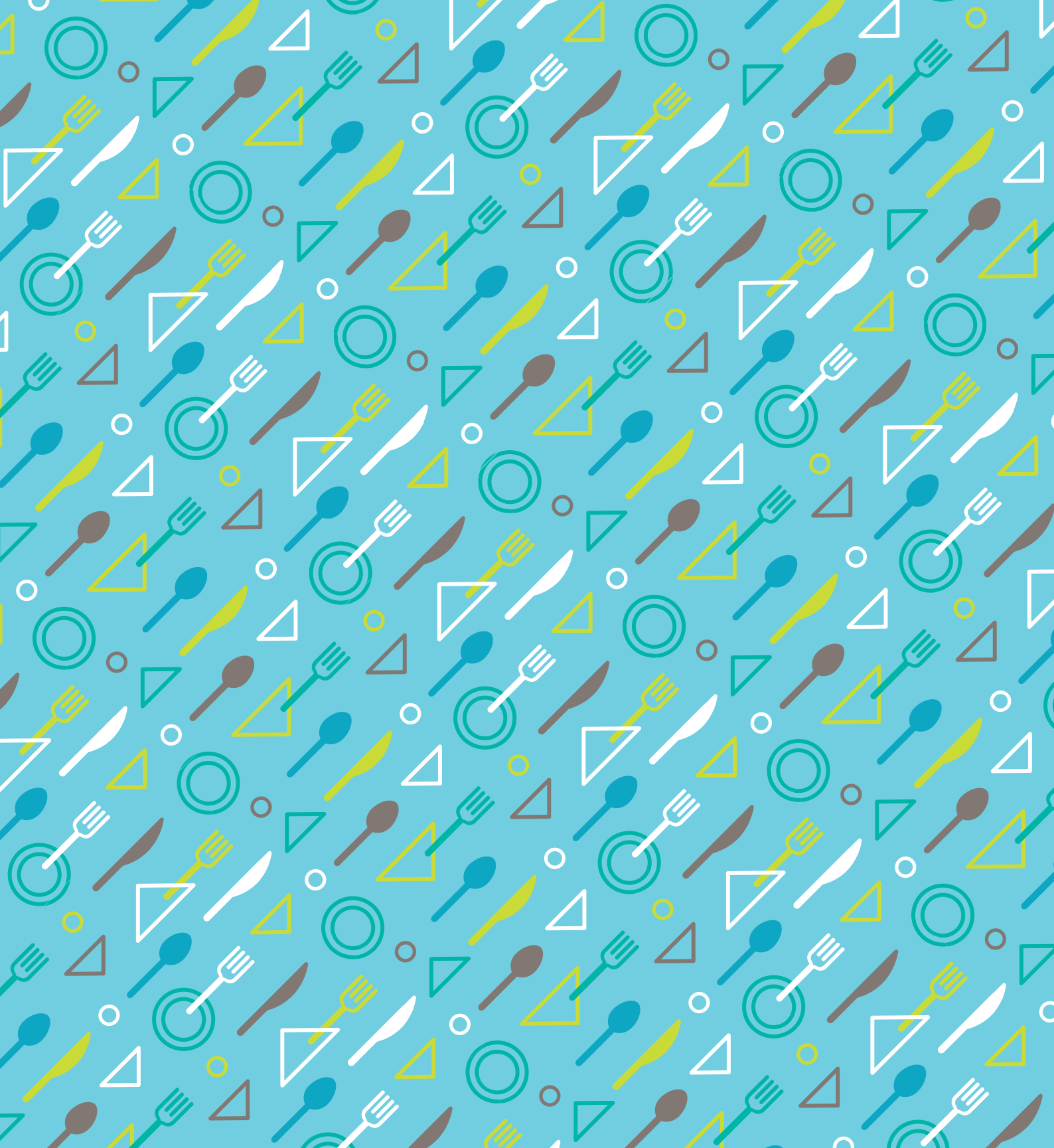
Seasoning and color can be added as suitable.

**preparation:** Soak the texturized protein in water ratio 1:3, refrigerate overnight, fine grind with meat grinder, Add to mixer: texturized soy protein + emulsion and mix on level 2/3 for 2 minutes, add remaining ingredients and mix on level 2/3 for 5 minutes; store in refrigerator until further processing.

components	amount (%)
soaked TVP / Soy (1:3)	40
isolated pea protein	4
isolated soy protein	8
<b>benece<sup>™</sup> MX 100 methylcellulose</b>	<b>1.6</b>
salt	1.8
water	30.4
veg oil	8
color	0.3
spice	2
dextrose	3.9
<b>total</b>	<b>100</b>

Seasoning and color can be added as suitable.

**preparation:** Soak the texturized protein in water ratio 1:3, refrigerate overnight, fine grind with meat grinder, Add to mixer: Soak the texturized protein + water COLD and mix on level 2/3 for 1 minute, add remaining ingredients and mix on level 2/3 for 5 minutes; store in refrigerator until further processing.



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