

# benecel™ mx modified cellulose

for plant based foods

The growing popularity of plant-based foods and meat alternatives has spurred innovation in end applications, ingredients and textures. Although products are usually suitable for vegetarian or vegans, they may also appeal to a wider audience. Some of the broader motivations for eating plant-based proteins include those seeking variety in their diet, concern for animal welfare, allergen avoidance, a desire to reduce the amount of meat that they consume or taste preference.

The right hydrocolloid helps you deliver a product with the desired eating quality and texture. Because of their versatility, hydrocolloids can help deliver sensory and functional benefits. Formulators use hydrocolloids to replicate the bite of a meat-based product, improve moisture retention, improve binding or help replace an allergic binder, like eggs.

Some applications require low temperature gelling properties. That's why we developed Benecel™ MX modified cellulose (methylcellulose). Benecel™ MX modified cellulose is specially formulated for meat alternative and vegetable-based applications. It can provide a firm bite for products meant to simulate meat products, binding to replace eggs, and can help retain moisture to provide an enjoyable eating experience.



## features and benefits

### Benecel™ MX modified cellulose creates a thermo-reversible gel

- unique grade of modified cellulose gels at ~40°C
- regular grades gel at 50–60°C

### Benecel™ MX modified cellulose exhibits high viscosity

- 2% MC in water has 7,500 - 70,000 mPa·s viscosity
- provides binding and helps formulations hold shape at cold temperatures

### modified cellulose is plant-derived

- suitable for vegan applications

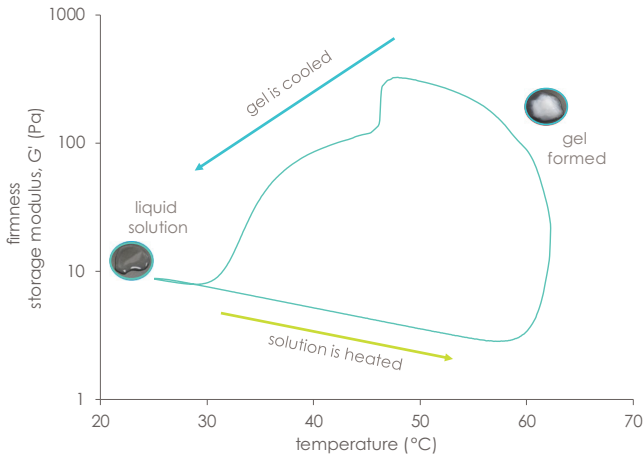
### molecular structure has hydrophilic and hydrophobic areas

- stabilizes fat and water to retain moisture in finished product
- optional replacement of fat with water

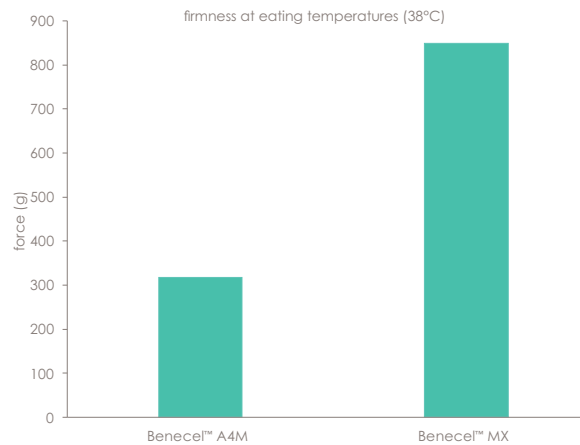
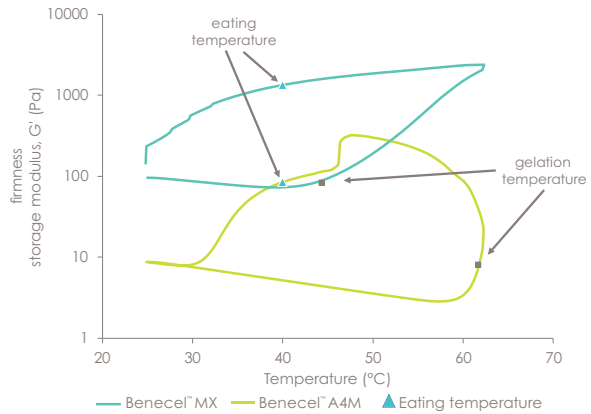
### Benecel™ MX modified cellulose can replicate a solid fat with liquid oils

- facilitates formula and cost flexibility

Traditional methylcellulose products are designed to gel at hot temperatures, but the gel reverses at lower temperatures.



Like other methylcellulose grades, Benece™ MX modified cellulose gels during the cooking process. The Benece™ MX grade is different because it maintains gel firmness as the product cools, so that at comfortable eating temperatures (38–40°C) bite integrity remains. The figures below demonstrate that Benece™ MX modified cellulose provides a higher gel firmness at 38°C vs. Benece™ A4M modified cellulose.



Emulsion of 4% methylcellulose (70 g) heated in glass dish in water bath to 60°C internal temperature and then cooled to 38°C. Firmness measured at 25% strain with TA.XT Plus with 45 mm diameter flat probe.

Benece™ MX modified cellulose is a versatile product and can be used to formulate sausages, meatballs, hams and other restructured meat products. Emulsions made with Benece™ MX modified cellulose will have good water binding abilities.



## sample formulation

### vegetable and grain burger

ingredient	weight %
oat flakes, wholemeal, fine	26.2
corn meal, fine	6.5
bouillon powder, vegetable flavored	2.8
carrots, granulated, dried	2.4
leek, chopped, dried	2.4
tomato flakes, dried	2.4
onions, granulated, dried	0.9
cold water (2-6°C)	55.6
Benece <sup>™</sup> MX modified cellulose	0.8
total	100.0
hydrocolloid emulsion	20.00
<b>total</b>	<b>100.00</b>

### vegan soy burger or sausage

ingredient	no binder % weight	Benece <sup>™</sup> MX % weight
textured vegetable protein	18.91	14.9
wheat gluten	18.91	14.9
soy sauce	3.78	3.0
isolated soy protein (ISP)	8.75	6.9
spices	0.95	0.8
salt	0.47	0.4
MSG	0.95	0.7
water	47.28	37.2
modified cellulose emulsion	-	21.4
Benece <sup>™</sup> MX modified cellulose	-	[6.0]
oil	-	[16.0]
ice water	-	[78.0]
	<b>100.0</b>	<b>100.0</b>

#### procedure:

1. Make modified cellulose emulsion by dispersing Benece<sup>™</sup> MX modified cellulose in oil and adding to ice water in food processor or bowl chopper (Figure 1)
2. Soak dry textured vegetable protein in water (40%) for 15 minutes and drain water before use (Figure 2)
3. Mix ISP and water (30%) in food processor until fully hydrated, with a consistent texture (Figure 3)
4. Mix wheat gluten and water (30%) into homogenous mass in food processor (Figure 4)
5. Combine protein masses, emulsion, soy sauce, and seasonings in food processor until well combined
6. Combine protein mass, emulsion, and sauces and seasonings
7. For vegan burger: form into patties, Cook the burger patties on medium heat (80°C) until desired doneness (5 minutes).
8. For vegan sausage: fill into cellulose-based sausage casings. Steam at 70°C for 5-7 minutes

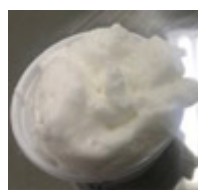


Fig. 1 Benece<sup>™</sup> MX emulsion

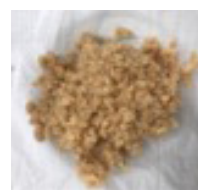


Fig. 2 Hydrated TVP



Fig. 3 Hydrated ISP



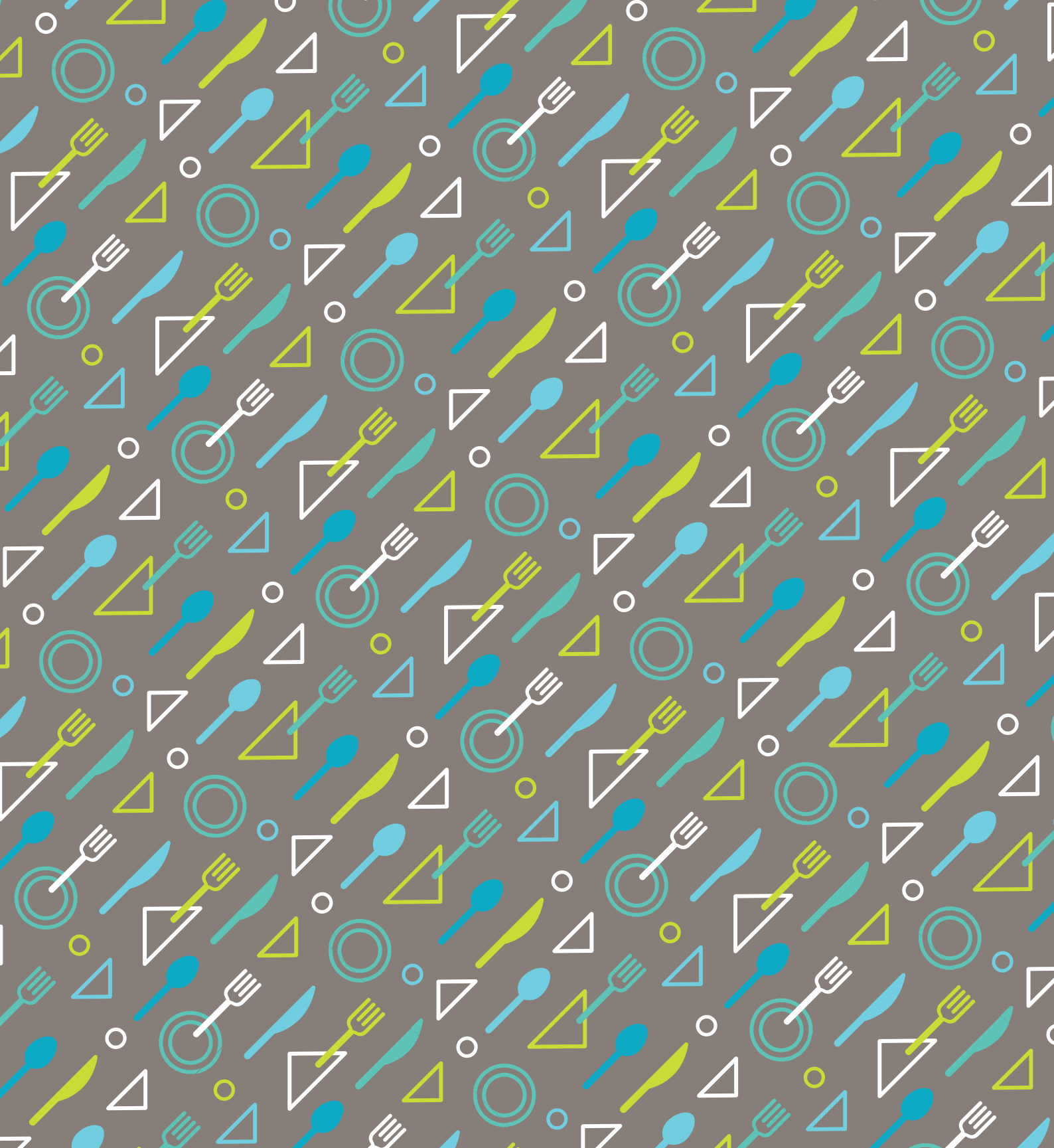
Fig. 4 Hydrated gluten



**Vegan burger with no binder (Control)**  
Surface cracking and less cohesion



**Vegan burger with Benece<sup>™</sup> MX modified cellulose**  
Little to no surface cracking and more cohesive patty



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