METOLOSE® & TYLOPUR®

Food Grades

The food ingredients to stabilize your food

Shin-Etsu

Benefits of METOLOSE® and TYLOPUR®

METOLOSE® and TYLOPUR® are Beneficial for many Applications

Application	Benefits of METOLOSE® and TYLOPUR®	Recommended grades	Dosage level [%]
 **Gluten-free products**	– Increase volume – Create soft texture – Mimic properties of gluten	**NE-15000** **NE-4000** **SFE-4000**	0.6 – 1.5
 **Vegan/Vegetarian products**	– Create strong bite – Create juicy texture – Mimic meatlike texture	**MCE-100TS** **MCE-4000**	0.5 – 2.0
 **Low-cost meat products**	– Create strong bite – Imitate meat structure during warm consumption – Lower overall costs	**MCE-100TS**	0.7 – 2.0
 **Fillings – savory and sweet**	– Retain product integrity at high temperatures – Prevent bursting and leakage	**MCE-4000** **NE-15000** **MCE-400**	0.3 – 0.6
 **Reformed products** *(potato, meat, cheese, fish)*	– Stabilize reformed products – Prevent leaking and bursting – Reduce oil uptake	**MCE-4000** **MCE-400** **MCE-100TS**	0.2 – 0.5
 **Non-dairy whipped cream**	– Improve overrun – Stabilize non-dairy whipped cream	**SFE-50** **SFE-400** **NE-4000**	0.1 – 0.6

For further applications please contact us – we look forward to assisting you.

Unique Stabilizers

METOLOSE® and TYLOPUR® food grades stabilize your food system even where other typical hydrocolloids fail. Our products ensure that structured products have a good shape and texture throughout the steps of processing, frying, cooking, freezing, and making the final preparations for serving. METOLOSE® and TYLOPUR® have the unique property of increasing viscosity during heating that will solve your problems.

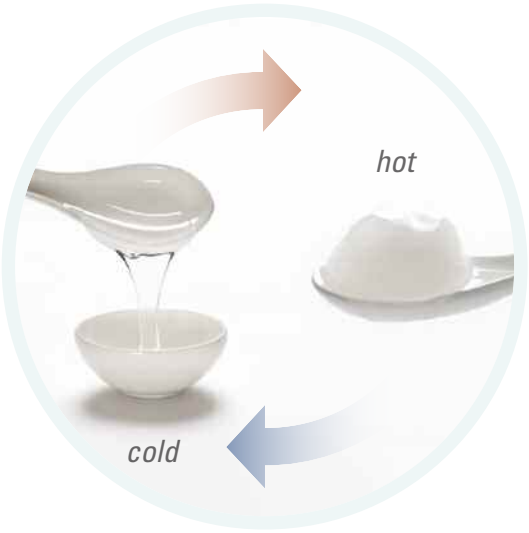

Figure 1: Pure 2 % METOLOSE® solution.

Benefits
– Maintain product shape during heating
– Provide reversible thermal gelation
– Prevent hard and gummy textures
– Provide fat-like mouthfeel
– Control viscosity at low and high temperature

Table 1: Benefits of METOLOSE® and TYLOPUR®.

General Properties
– Vegan
– Thickening
– Film-forming
– Stable in various pHs
– Derived from non-GMO wood pulp

Table 2: Properties of METOLOSE® and TYLOPUR®.

Thermal Gelation

METOLOSE® and TYLOPUR® have the unique property of increasing viscosity during heating. When food containing METOLOSE® or TYLOPUR® is heated, a gel starts to form above a given temperature.

Figure 2 shows the thermal gelation of 2 % METOLOSE® MCE-4000 and METOLOSE® MCE-100TS solutions. If the solution is heated, the viscous solution starts to gel (A) and the viscosity increases. During cooling, the viscosity drops to the original value (B).

It is necessary to cool below the hydration temperature (C) of the wet food containing METOLOSE® and TYLOPUR®, to guarantee optimal functionality.

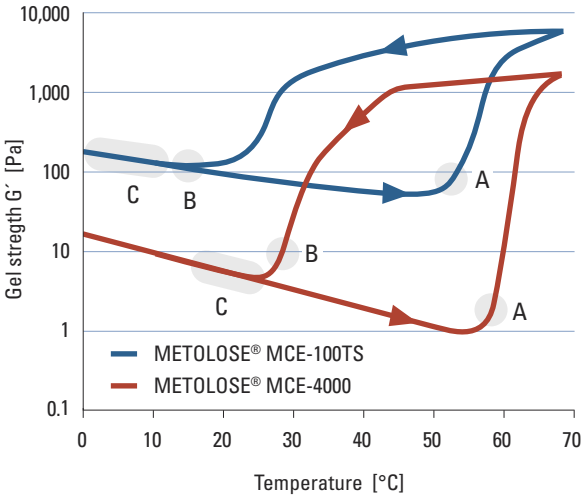

Figure 2: Gelation of 2 % aqueous solutions of METOLOSE® MCE-4000 and METOLOSE® MCE-100TS.

Grades of METOLOSE® and TYLOPUR®

Viscosity 2 % aqueous solution [mPa·s]	**MCE-100TS**	**MCE**	**SFE**	**SE**	**NE**
6				SE-6 T	
15		MCE-15 M			
50			SFE-50 M		
400		MCE-400 M	SFE-400 M		
1500		MCE-1500 M			
4000		MCE-4000 M	SFE-4000 M T		NE-4000 M T
15000					NE-15000 T
110000	MCE-100TS M				

M *available as METOLOSE®* T *available as TYLOPUR®*

Table 3: Available grades of METOLOSE® and TYLOPUR®.

	MCE-100TS	**MCE**	**SFE**	**SE**	**NE**
Pictures of hot gel of a 2 % aqueous solution					
Labeling	Methylcellulose, E461 USA: Modified Cellulose		Hydroxypropyl Methylcellulose, E464 USA: Modified Cellulose		
Methoxyl content [%]	27.5 – 31.5	27.5 – 31.5	27 – 30	28 – 30	19 – 24
Hydoxypropoxyl content [%]	0	0	4 – 7.5	7 – 12	4 – 12
Gelation temperature* (A)	55 °C	60 °C	70 °C	65 °C	75 °C
Disappearance of gel after heating* (B)	15 °C	30 °C	50 °C	55 °C	65 °C
Hydration temperature* (C)	0 – 15 °C	15 – 25 °C	45 °C		
Properties	Very firm gel, cooling required	Firm gel, good shape and water retention	Semi-firm gel, foam stabilization	Semi-firm gel, very good film forming property	Soft gel, high sugar tolerance

* *Dosage and type of food affect gelation temperature, disappearance of gel, and hydration temperature*

Table 4: Properties of different grades of METOLOSE® and TYLOPUR®.

Mixing and Cooling

METOLOSE® and TYLOPUR® require the right mixing and cooling to achieve their full potential. It is important to use one of the below-mentioned ways of mixing to prevent lumping. Furthermore, it is important to cool down food containing METOLOSE® and TYLOPUR® below the mentioned hydration temperatures. For example, food containing METOLOSE® MCE-100TS needs to be cooled below 15 °C for a good bite and below 5 °C for an optimal bite.

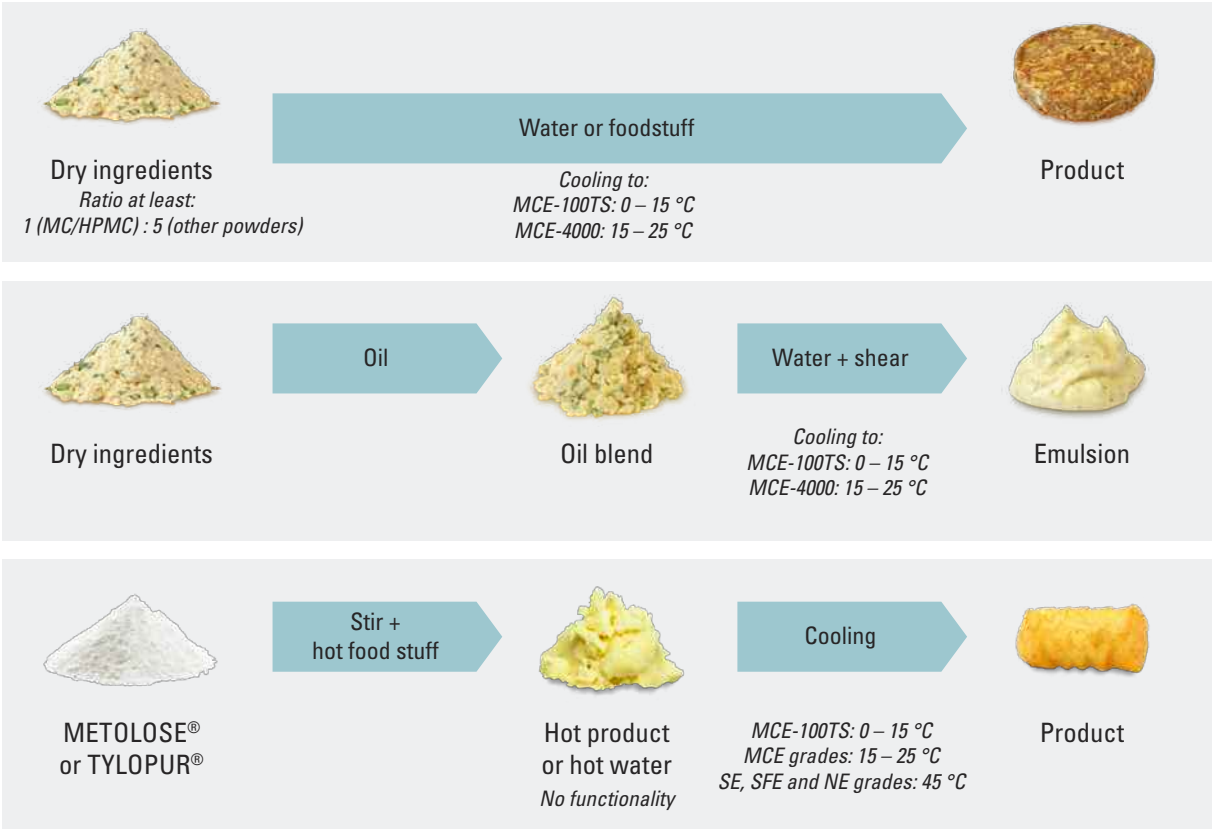

Table 5: Scheme of mixing and cooling to METOLOSE® and TYLOPUR®.

Case Study – The Right Preparation and Cooling of Vegan Burgers

Vegan burgers were made according to the recipe on page 8 using different cooling temperatures and preparations. Standard burgers were made by keeping the emulsion with METOLOSE® MCE-100TS for 2 h below 5 °C. Afterwards the wet mix with added texturates was kept for 24 h in the refrigerator to guarantee optimal bite after frying.

Preparation temperature	5 °C	10 °C	15 °C	5 °C	5 or 15 °C	5 °C
Grade	MCE-100TS	MCE-100TS	MCE-100TS	MCE-100TS	MCE-4000	MCE-100TS
Emulsion made	•	•	•		•	•
Keep wet mixture 24 h < 5 °C	•	•	•	•	•	
Hot bite of burgers	+++	++	+	++	+	+

+++ *very good* ++ *very good to good* + *good*

Table 6: Influence of cooling temperature and preparation method on hot bite of vegan burgers.

Example Recipes

Example Recipes

Gluten-free Bread

1. Weigh all dry ingredients and blend well.
2. Add liquid ingredients (29 °C) and knead for 6 min.
3. Prove 350 g in baking tins for 75 min (37 °C, 86 % humidity).
4. Preheat oven to 250 °C. Place bread in preheated oven. Bake at 200 °C, rotating air with steam for 1 min, then with air for 35 min. Leave the bread in the baking tin for 2 min after baking.

Ingredients	Dosage [%]
Water	29.5
Sourdough	29
Cornstarch	25
Canola oil	5
Sugar	3
Psyllium	2
Yeast (fresh)	2
Pea protein	1.7
Salt	1.4
TYLOPUR® NE-15000	1.2
Guar gum	0.2
Total	*100*

Benefits

– Good volume
– Soft crumb

Vegan Burger

1. Blend all dry ingredients except for the texturates.
2. Add oil and blend well.
3. Add cold water and emulsify all ingredients with high shear below 5 °C. Keep 2 h below 5 °C and emulsify again.
4. Add texturates and color and mix well.
5. Keep the wet mixture for 24 h in the refrigerator.
6. Form burger patties and fry them in a pan.

Ingredients	Dosage [%]
Water	64.8
Wheat texturates	14.5
Canola oil	10
Pea protein	5.5
METOLOSE® MCE-100TS	1.8
Steak flavor (Exter)	1
Salt	0.9
Potato starch	0.7
Umami flavor	0.5
Color	0.3
Total	*100*

Benefits

– Strong bite
– Meatlike texture

Vegetarian Sausage

1. Blend all dry ingredients except for the egg white powder.
2. Add oil and blend well.
3. Add onions and water (if possible < 5 °C) and emulsify all ingredients. Cool mix below 20 °C.
4. Add egg white powder and emulsify well.
5. Fill sausages and heat them for about 10 min to an inner temperature above 70 °C in hot but not boiling water.

Ingredients	Dosage [%]
Water	56
Canola oil	18
Soy protein	8
Egg white powder	5
Aroma vegetarian sausage	4.5
Onions	4
Processed euchema seaweed	2
METOLOSE® MCE-4000	1.5
Salt	1
Total	*100*

Benefits

– Strong meatlike bite
– Perfect texture

Low-cost Sausages

1. **Matrix:** Mix dry ingredients of matrix with oil.
2. Blend and emulsify together with ice cold (0 – 4 °C) water.
3. **Meat-reduced sausages:** Place minced meat in a cutter and blend for a few rounds.
4. Add seasoning ingredients.
5. Add ice and blend well until a temperature of 3 – 4 °C is reached.
6. Add oil and blend well until a temperature of 10 – 11 °C is reached.
7. Add matrix and blend briefly.
8. Fill the casings with the sausage mix and proceed with smoking, reddening, drying, and blanching.

Ingredients matrix	[%]
Water	72.7
Oil	18.2
MCE-100TS	4.6
Potato starch	2.2
Salt	0.8
Sodium gluconate	0.7
MCC	0.5
Sodium carbonate	0.4
Total	*100*

Ingredients sausage	[%]
Matrix	30
Pork meat	49
Oil	10.5
Ice	10.5
Total	*100*
Seasoning *[g] per kg mix*	*33.2*

Benefits

– Excellent bite
– Lower costs

Example Recipes

Mozzarella Sticks

1. Mix starch and **METOLOSE® MCE-4000**.
2. Add water (approx. 15 °C) and mix well. Hydrate mixture for 15 min.
3. Add cheese and blend the mixture until texture feels smooth and plastic.
4. Shape mixture into sticks. Batter (30 % wheat flour, 70 % water) and bread sticks two times. Pre-fry for 40 s at 170 – 180 °C. Freeze sticks.
5. Fry frozen sticks for 270 s at 170 – 180 °C.

Ingredients	Dosage [%]
Shredded mozzarella	90.6
Water	6
Cornstarch	3
METOLOSE® MCE-4000	0.4
Total	*100*

Benefits

– Excellent stabilization
– No bursting of the fried product

Potato Croquettes

1. Cook floury potatoes in salted water for about 15 min.
2. Mix dry ingredients.
3. Cool down potatoes to room temperature.
4. Add dry blend and prepare a mash.
5. Add water and mix well.
6. Form croquettes by extruding and breading.
7. Pre-fry 40 s at 180 °C, afterwards freeze croquettes.
8. Fry at 180 °C for 4 min before consumption.

Ingredients	Dosage [%]
Cooked floury potatoes	80
Water	16
Potato starch	3
Salt	0.65
METOLOSE® MCE-4000	0.3
Nutmeg	0.05
Total	*100*

Benefits

– Improved stability
– Lower production costs

Pizza Pockets

1. Weigh all dry ingredients and blend well.
2. Add the oil to the blend.
3. Slowly add the oil blend to the tomato puree.
4. Place mixture in the refrigerator for 15 min, Temperature of mix should be below 20 °C
5. Mix 100 g of tomato puree with 50 g cheddar cheese and 25 g of ham pieces.
6. Place 50 g of mixture on 50 g of pizza dough and form a pocket.
7. Bake in the oven at 220 °C for 11 min.

Ingredients	Dosage [%]
Tomato puree	93.6
Oil	3
Modified starch	2
METOLOSE® MCE-4000	0.5
Herbs	0.3
Garlic powder	0.1
Total	*100*

Benefits

– No leakage or breakdown of the product
– Good succulence

Non-dairy Whipped Cream

1. Melt the palm kernel oil at 70 °C. Stir at 200 rpm. Add emulsifiers, **METOLOSE® SFE-50**, and sodium alginate to the oil phase at 70 °C, while stirring at 300 rpm for 15 min.
2. Heat the water separately to 80 °C. Add the granulated sugar. Stir the mixture at 300 rpm for 10 min.
3. Slowly add the aqueous phase to the oil phase while stirring. Stir the mixture at 350 rpm for 30 min at 70 °C.
4. Homogenize the mixture at 50 °C and 500 bar.
5. Store the mixture at 4 – 8 °C for at least 24 h.
6. Before whipping, mix 2 parts of the whipped cream with 1 part cold water.
7. Whip the non-dairy whipped cream for 1 min at medium speed and for 3 more min at high speed.

Ingredients	Dosage [%]
Water	44.56
Palm kernel oil	32
Sugar	22
METOLOSE® SFE-50	0.6
Polysorbate 60	0.3
Salt	0.19
Sorbitan monostearate	0.18
Sodium alginate	0.15
Polysorbate 80	0.02
Total	*100*

Benefits

– Stable creamy foam with increased overrun
– Texture with fat-like mouthfeel

General Information

Description
White to slightly off-white powder

Certificates
GMO-free, Allergen free, Kosher, Halal
ISO 9001, ISO14001

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