SODA-LO® Salt Microspheres

Innovation in sodium reduction preserving a clean taste and clean label

Case study in bread and snacks application

Jacques MASSET
Food Matters Live, November 2014
Consumers want the best of both worlds

65% of consumers say they try to “minimise or avoid” foods high in salt in their diet

But 76% say taste is the most important consideration when choosing what to eat or drink

Manufacturers take action but remain quiet about it!

Source: GfK research (Ropers Worldwide)
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Simply take out salt?

Could work to some extent but limited with regards to:

- **Timeline of reduction**
- **Level of reduction**
- **Willingness to compromise on taste**
- Salt is not just for taste: **technological issues**
- **Benchmarking**: competition using sodium reduction ingredients to achieve a better quality
SODA-LO®
Salt Microspheres
The **hollow microsphere** structure of SODA-LO® maximizes the contact surface relative to the weight and allows a **better distribution** into the application matrix.

This makes it possible to deliver the same product attributes such as salty taste, texture and other functionalities with **lower levels of sodium.**

**Bulk density** (typical value) of 0.45 g/cm³ versus 1.2 g/cm³ for regular fine salt.
A Patented Process

Sea salt (sodium chloride)

Maltodextrin or Acacia gum

Proprietary Spray Drying Technology

Hollow Crystalline Microspheres

Water
SODA-LO® Salt Microspheres value proposition

SODA-LO® Salt Microspheres is the salt-reduction ingredient that tastes, labels* and functions like salt - because it is made of salt!

1. Reduces salt levels by up to 50%
2. Has the natural and clean taste of salt
3. Provides a clean label*
4. Delivers functional attributes of salt
5. Formulates well in a wide range of food applications
6. Does not cake

* Labeling in EU28 for Fine is “salt” and for Extra Fine M is “salt and maltodextrin” or “micronized salt” (based on Article 20.c of Regulation (EU)1169/2011, when maltodextrin is used as a carrier, it could be exempt of labelling) ; SODA-LO® is made of sea salt.

Labels and claims may vary by country. Prospective purchasers are advised to conduct their own tests, studies, and regulatory review to determine the fitness of Tate & Lyle products for their particular purposes, product claims or specific applications.
**SODA-LO® Salt Microspheres - Product options**

<table>
<thead>
<tr>
<th></th>
<th>Salt Reduction Capability</th>
<th>Key Attributes</th>
<th>Use</th>
<th>Labelling EU28*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SODA-LO® Fine</strong></td>
<td>Up to 30%</td>
<td>Provides the appearance of salt in topical application</td>
<td>For moderate sodium reduction</td>
<td>“salt”</td>
</tr>
<tr>
<td></td>
<td>by replacing all the regular salt with 30% less SODA-LO® by weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SODA-LO® Extra Fine M</strong></td>
<td>Up to 50%</td>
<td>Optimal resistance to caking in hot, humid environments</td>
<td>For more aggressive sodium reduction</td>
<td>“salt, maltodextrin” or “micronized salt”</td>
</tr>
<tr>
<td></td>
<td>Partial or total replacement of the regular salt</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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CASE STUDY #1

SODA-LO® Salt Microspheres in Chorleywood process bread
Bread is a major contributor to our sodium daily intake

20%
Average contribution to daily salt intake from Bread across European countries*

Source: EU Salt Report – survey of member countries 2012
Bread and UK Responsibility Deal initiative

Average salt content (g per 100g bread) limits under UK Responsibility Deal targets

- Bread and Rolls with additions
- Bread and Rolls

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### Current options for further sodium reduction

<table>
<thead>
<tr>
<th>Option</th>
<th>Consequence</th>
<th>Consumer Compromise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simply take out even more salt</td>
<td>• Lose functionality of salt in bread</td>
<td>• Bread has poor texture, breaks up</td>
</tr>
<tr>
<td></td>
<td>• Flavour is impacted</td>
<td>• Lack of flavour</td>
</tr>
<tr>
<td>Use potassium chloride based products</td>
<td>• Ingredients declaration changes</td>
<td>• Label not appealing</td>
</tr>
<tr>
<td></td>
<td>• Bread can take on some bitterness due to potassium chloride</td>
<td>Potassium may not be suitable for all people</td>
</tr>
<tr>
<td>Sea Salt blends</td>
<td>• Ingredients declaration changes</td>
<td>• Risk of bitterness</td>
</tr>
<tr>
<td></td>
<td>• Bread can take on some bitterness due to potassium chloride in sea salt blends</td>
<td></td>
</tr>
</tbody>
</table>

Potassium may not be suitable for all people.

Risk of bitterness.

Label appeal? Potassium may not be suitable for all people.

Risk of bitterness.
SODA-LO® Salt Microspheres in Chorleywood process

✓ Most of the UK manufacturers are using a Chorleywood process to make bread

✓ It is a specific high stirring speed process which reduces the processing time and allows the use of lower-protein wheat flour

✓ Study conducted by Campden

✓ Objective = meet with SODA-LO® the targets of 360 mg of sodium per 100g (0.9% salt) and 320 mg of sodium per 100g (0.8% salt) making sure to maintain the taste, overall quality and clean label of the bread
Targeting **360mg** of sodium per 100g

1% of salt (400 mg of sodium) in the final product = 1.5% of salt based on wheat flour

1. **Control**: 1.5% salt on wheat flour
   - 400mg Na

2. **Negative control**: 1.35% salt on wheat flour
   - 360mg Na

3. **SODA-LO® Fine** replacing salt
   - 360 mg Na

4. 65% brine + 35% **SODA-LO® Extra Fine M**
   - 360 mg Na
360 mg of sodium – Analytical results

Compared to Control

- **Moisture**: No significant difference

- **Volume**: Slight differences observed
  - Less sodium = higher volume

- **Texture of dough (firmness/stickiness)**: No significant difference

- **Texture of crumb**: No significant difference in firmness and resilience
  - Slight difference with brine + SODA-LO® Extra Fine M with a smaller number of cells and larger cells diameter

- **Brightness**: Breads made with SODA-LO® are brighter
Panel of 42 judges from Campden BRI trained on triangle tests
Triangle tests run between SODA-LO® recipes and control/negative Control

**Compared to control**

- **SODA-LO® Fine**: No significant difference
- **Extra Fine M + Brine**: Significantly similar to control

**Compared to negative control**

- **SODA-LO® Fine** similar to negative control although with more positive comments: “saltier”, “fresher”, “nicer crumb”
- **SODA-LO® Extra Fine M + Brine** is significantly different to negative control, mainly on texture with a better crumb consistency
360 mg of sodium – Conclusions

- Recipes with SODA-LO® Salt Microspheres similar to the control with regards to taste, texture and appearance
- **Crumb** slightly better in quality: Finer and brighter
- No significant change in the dough affecting the production
- **SODA-LO®** Salt Microspheres makes the difference with the negative control (salt reduced only) in texture and taste!
Targeting 320mg of sodium per 100g

1% of salt (400 mg of sodium) in the final product = 1.5% of salt based on wheat flour

1. Control: 1.5% salt on wheat flour
   400mg Na

2. Negative control: 1.2% salt on wheat flour
   320mg Na

3. SODA-LO® Fine replacing salt
   320 mg Na

4. SODA-LO® Extra Fine M replacing salt
   320 mg Na

5. Partial replacement of salt:
   50% salt + 50% SODA-LO® Extra Fine M
   320 mg Na
Conclusion bread with 320 mg sodium content

- Recipes made with SODA-LO®: Similar to the control with regards to taste, texture and appearance
- Crumb slightly better in quality: Finer and brighter
- No significant change in the dough affecting the production
- SODA-LO® Salt Microspheres makes the difference with the negative control (salt reduced only) in texture and taste!
- Partial replacement of salt with SODA-LO® Extra Fine M provides good results

![Image of woman eating a sandwich]
Campden BRI conclusion

- Usage of SODA-LO® Salt Microspheres in Chorleywood process appears to result in bread with similar technological properties.

- Sodium reduction via total or partial replacement of sodium chloride with SODA-LO® Salt Microspheres provides good results with limited impact on dough rheology and comparable organoleptic parameters (colours, texture and taste).
SODA-LO® not just an innovation but a commercial success

Sliced sandwich bread

Frozen bread

Pizza dough

Bread mix

Bun and sandwich bread

Artisan bread

Brioche

Pictures shown here illustrate the types of products in which SODA-LO® is used. They do not represent the existing commercial products.
CASE STUDY #2
SODA-LO® Salt Microspheres in snacks
Salted peanuts - 30% sodium reduction

Use SODA-LO® Extra Fine M to reduce sodium content in oil roasted peanuts while delivering great salty taste

Benefits:
- Clean salt taste
- 30% sodium reduction
- Clean label*
- Excellent adherence and coverage

<table>
<thead>
<tr>
<th>Nutrition Information Per 100 grams</th>
<th>Control 1.2% salt</th>
<th>SODA-LO® Extra Fine M 0.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>2385kJ</td>
<td>2385kJ</td>
</tr>
<tr>
<td></td>
<td>570kcal</td>
<td>570kcal</td>
</tr>
<tr>
<td>Fat</td>
<td>46.5g</td>
<td>46.5g</td>
</tr>
<tr>
<td>of which saturated</td>
<td>7g</td>
<td>7g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>14.5g</td>
<td>14.5g</td>
</tr>
<tr>
<td>of which sugars</td>
<td>0g</td>
<td>0g</td>
</tr>
<tr>
<td>Fibre</td>
<td>7g</td>
<td>7g</td>
</tr>
<tr>
<td>Protein</td>
<td>25g</td>
<td>26g</td>
</tr>
<tr>
<td>Salt</td>
<td>1.2g</td>
<td>0.85g</td>
</tr>
</tbody>
</table>

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SODA-LO® Salt Microspheres provides superior distribution

Microscopic picture of the surface of salted peanut

SODA-LO® Salt Microspheres

“Regular” Salt
Salted Peanuts - Sensory analysis

SODA-LO® Extra Fine M was shown to be equal in saltiness to the full salt control and significantly more salty than the negative control.
SODA-LO® the new shape of salt!

Questions?

Contact: www.sodalo.com