Acrylamide reduction with Monosodium Citrate

For safe and tasty products
Acrylamide reduction strategies

Acrylamide, a suspected carcinogen, can be formed in the presence of asparagine and reducing sugars during high-temperature heat treatment of starchy food. Significant amounts may evolve especially during baking, frying and roasting. The control of detrimental acrylamide in food plays an important role for food manufacturers to address food safety and consumer concerns.

Current approaches to reduce acrylamide in foods are as follows:

- pre-selection of raw materials, e.g. potatoes with low concentration of reducing sugars or flours with lower asparagine contents
- modification of process steps, e.g. reduction of processing temperature and/or heating time
- lowering pH, e.g. by adding citric acid
- addition of inhibitory substances, e.g. certain enzymes, sodium chloride or mineral salts

Advantages of Monosodium Citrate

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<thead>
<tr>
<th>Product Quality</th>
<th>Processing</th>
<th>Economics</th>
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<tbody>
<tr>
<td>Up to 80% acrylamide reduction</td>
<td>Excellent dissolution</td>
<td>No retention time necessary</td>
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<tr>
<td>Neutral taste</td>
<td>Suitable for pneumatic transport</td>
<td>Easy handling</td>
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<td>Minimal effect on pH levels</td>
<td>Non-corrosive</td>
<td>Low costs of use</td>
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<td>No allergen or GMO issues</td>
<td>For wet and dry processing</td>
<td>No labeling</td>
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<td>Heat stable</td>
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What is Monosodium Citrate?

Monosodium citrate is a monobasic salt of citric acid and represents an innovative and cost-effective food additive tackling the acrylamide problem. It is an U.S. GRAS and EU approved sodium citrate (E331), a common acidity regulator. Monosodium citrate comes in the form of a white, odourless and non-hygroscopic powder and is well-suited for acrylamide reduction. It provides a pleasant, slightly acidic taste profile, has quick dissolution properties, a good solubility (180 g/L) and high heat stability.

Applications and dosage

Main applications for monosodium citrate are French fries, chips and cereals with dosages between 0.5-2%. Other applications are snacks and bakery. Monosodium citrate may be added to the process in various ways, e.g. via direct addition to the dry mix or dough and via a dipping bath or spraying solution. Its use may not have to be labelled on the end product packaging when used as a processing aid.

Influence of Monosodium Citrate on acrylamide content measured after frying, cooking or baking. No taste or quality defects were observed at given dosage rates

- Stackable chips + MSC* -42%
- Breakfast cereals 0.5% MSC -78%
- French fries 1% MSC -68%
- Baby biscuits 0.5% MSC -48%

*with kind permission of EMSLAND GROUP, Germany, applying typical MSC dosage rates for industrial processes

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The information contained herein is meant to demonstrate how our products can be used. This formulation has been subjected to limited stability tests and has been shown to perform well. The given data are suggestions without any guarantee aimed to support customers’ development.