Quality Control Monitoring with E-Nose
Applications with Chocolate Aroma

Results obtained at Alpha MOS Laboratory, Toulouse, France

Introduction

The following example demonstrates one of the QC/QA, more especially, the study of chocolate aroma ageing:
• Correlation with the manufacturing date
• Correlation with the ageing and identification of rejected samples.

Sampling and operating conditions

Samples:
• 5 batches of chocolate powder C5, C7, C8, C9 and C10 respectively manufactured in D5, D7, D8, D9 and D10: This is the training set
• 2 unknown samples A and B to identify by comparison with the reference

Analytical Conditions:
Fox 4000 – Dry air

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate (ml/mn)</td>
<td>150</td>
</tr>
<tr>
<td>Injection volume (µl)</td>
<td>1500</td>
</tr>
<tr>
<td>Quantity of Sample (g)</td>
<td>0.2</td>
</tr>
<tr>
<td>Vial type (ml)</td>
<td>10</td>
</tr>
<tr>
<td>Injection speed (µl/sec)</td>
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<tr>
<td>Acquisition time (sec)</td>
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</tr>
<tr>
<td>Headspace generation temperature (°C)</td>
<td>50</td>
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<tr>
<td>Time between 2 analysis (min)</td>
<td>15</td>
</tr>
<tr>
<td>Headspace generation time (min)</td>
<td>10</td>
</tr>
</tbody>
</table>

Correlation with the manufacturing date of the chocolate powder

PLS Representation

Training samples

Correlation with the manufacturing date represented on the X axis: D5; D7; D8; D9 and D10

Identification of unknown samples

Unknown samples are well recognized: A and B are respectively manufactured in date D7 and D10
Identification of rejected samples

✓ Among the 5 batches, C9 and C10 are the reference batches which have the right aroma level.

✓ The objective is to identify the unknown samples as good or bad samples in comparison with the references.

✓ The SQC process (Statistical Quality Control) will rapidly assess the quality of the products by comparing to a reference to predict new batch quality.

These results are in conformity with the sensory panel: C7, C8, C5 and A (C7) batches are rejected due to an ageing of the product.

Conclusion

The results obtained using PLS and SQC data for the quantification and the control of chocolate aroma demonstrate the ability of the Electronic nose to give the following information:

• Correlation with the manufacturing date that allows the product consistent.

• Correlation with the sensory panel on the accepted chocolate aroma.