TURKEY MEAT

Thermal Analysis offers powerful tools for the investigation of food and its packaging materials: using Thermogravimetry (TG) and Differential Scanning Calorimetry (DSC), for example, drying, aging, thermal stability, melting and other phase transformations, purity, the influence of additives and the specific heat capacity can be studied. The following example describes simultaneous TG+DSC (=STA) measurements on turkey breast meat which revealed mainly the moisture content as well as the temperature-dependent specific heat $c_p$.

**Results**

Depicted in figure 1 (page 1) above are the temperature-dependent mass change, rate of mass change and specific heat of a turkey breast sample measured with a crucible with pierced lid. Prior to starting the measurement, the sample lost 3.8% of its initial weight because of drying of the sample. Upon heating to 240°C, two mass-loss steps of 33.7% and 29.9% were observed which are due to the evaporation of moisture and the beginning pyrolysis of the sample. Maxima in the rate of mass change occurred at 85°C and 121°C. The specific heat was 1.7 $J/(g·K)$ at –50°C. Between –20°C and 200°C, the $c_p$ curve is dominated by the melting peak at 8°C and further endothermic peaks at 90°C and 127°C which are related to the mass loss. The entire enthalpy of these endothermic effects is 2.5 $kJ/g$. At 200°C a $c_p$ value of 3.6 $J/(g·K)$ was measured.

**Instrument**

STA 449 C Jupiter®

**Test Conditions**

<table>
<thead>
<tr>
<th>Temperature range</th>
<th>50°C ... 240°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating/cooling rates</td>
<td>10 K/min</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Helium at 70 ml/min</td>
</tr>
<tr>
<td>Sample mass</td>
<td>approx. 25 mg</td>
</tr>
<tr>
<td>Crucible</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Sensor</td>
<td>TG-DSC type E</td>
</tr>
</tbody>
</table>

**Figure 1**

Sample: Turkey Breast

Depicted in figure 1 (page 1) above are the temperature-dependent mass change, rate of mass change and specific heat of a turkey breast sample measured with a crucible with pierced lid. Prior to starting the measurement, the sample lost 3.8% of its initial weight because of drying of the sample. Upon heating to 240°C, two mass-loss steps of 33.7% and 29.9% were observed which are due to the evaporation of moisture and the beginning pyrolysis of the sample. Maxima in the rate of mass change occurred at 85°C and 121°C. The specific heat was 1.7 $J/(g·K)$ at –50°C. Between –20°C and 200°C, the $c_p$ curve is dominated by the melting peak at 8°C and further endothermic peaks at 90°C and 127°C which are related to the mass loss. The entire enthalpy of these endothermic effects is 2.5 $kJ/g$. At 200°C a $c_p$ value of 3.6 $J/(g·K)$ was measured.

**Figure 1**

Sample: Turkey Breast

Depicted in figure 1 (page 1) above are the temperature-dependent mass change, rate of mass change and specific heat of a turkey breast sample measured with a crucible with pierced lid. Prior to starting the measurement, the sample lost 3.8% of its initial weight because of drying of the sample. Upon heating to 240°C, two mass-loss steps of 33.7% and 29.9% were observed which are due to the evaporation of moisture and the beginning pyrolysis of the sample. Maxima in the rate of mass change occurred at 85°C and 121°C. The specific heat was 1.7 $J/(g·K)$ at –50°C. Between –20°C and 200°C, the $c_p$ curve is dominated by the melting peak at 8°C and further endothermic peaks at 90°C and 127°C which are related to the mass loss. The entire enthalpy of these endothermic effects is 2.5 $kJ/g$. At 200°C a $c_p$ value of 3.6 $J/(g·K)$ was measured.

**Figure 1**

Sample: Turkey Breast

Depicted in figure 1 (page 1) above are the temperature-dependent mass change, rate of mass change and specific heat of a turkey breast sample measured with a crucible with pierced lid. Prior to starting the measurement, the sample lost 3.8% of its initial weight because of drying of the sample. Upon heating to 240°C, two mass-loss steps of 33.7% and 29.9% were observed which are due to the evaporation of moisture and the beginning pyrolysis of the sample. Maxima in the rate of mass change occurred at 85°C and 121°C. The specific heat was 1.7 $J/(g·K)$ at –50°C. Between –20°C and 200°C, the $c_p$ curve is dominated by the melting peak at 8°C and further endothermic peaks at 90°C and 127°C which are related to the mass loss. The entire enthalpy of these endothermic effects is 2.5 $kJ/g$. At 200°C a $c_p$ value of 3.6 $J/(g·K)$ was measured.

**Figure 1**

Sample: Turkey Breast

Depicted in figure 1 (page 1) above are the temperature-dependent mass change, rate of mass change and specific heat of a turkey breast sample measured with a crucible with pierced lid. Prior to starting the measurement, the sample lost 3.8% of its initial weight because of drying of the sample. Upon heating to 240°C, two mass-loss steps of 33.7% and 29.9% were observed which are due to the evaporation of moisture and the beginning pyrolysis of the sample. Maxima in the rate of mass change occurred at 85°C and 121°C. The specific heat was 1.7 $J/(g·K)$ at –50°C. Between –20°C and 200°C, the $c_p$ curve is dominated by the melting peak at 8°C and further endothermic peaks at 90°C and 127°C which are related to the mass loss. The entire enthalpy of these endothermic effects is 2.5 $kJ/g$. At 200°C a $c_p$ value of 3.6 $J/(g·K)$ was measured.

**Figure 1**

Sample: Turkey Breast

Depicted in figure 1 (page 1) above are the temperature-dependent mass change, rate of mass change and specific heat of a turkey breast sample measured with a crucible with pierced lid. Prior to starting the measurement, the sample lost 3.8% of its initial weight because of drying of the sample. Upon heating to 240°C, two mass-loss steps of 33.7% and 29.9% were observed which are due to the evaporation of moisture and the beginning pyrolysis of the sample. Maxima in the rate of mass change occurred at 85°C and 121°C. The specific heat was 1.7 $J/(g·K)$ at –50°C. Between –20°C and 200°C, the $c_p$ curve is dominated by the melting peak at 8°C and further endothermic peaks at 90°C and 127°C which are related to the mass loss. The entire enthalpy of these endothermic effects is 2.5 $kJ/g$. At 200°C a $c_p$ value of 3.6 $J/(g·K)$ was measured.
The figure above shows the result of another STA measurement with a sealed crucible. Below ~100°C where the crucible remains closed, no mass changes were observed. The cp curve is in accordance with the measurement of the first figure: 1.7 J/(g·K) at –50°C, 3.4 J/(g·K) at 30°C and 3.7 J/(g·K) at 100°C. Apart from the melting peak of water with an enthalpy of 180 J/g, further two overlapping endothermic peaks at 56°C and 66°C with an entire enthalpy of 1.6 J/g were observed. These effects could be due to melting of fat or denaturation of the protein content.