Determination of fluorine, chlorine and sulfur in toner

<table>
<thead>
<tr>
<th>Sample name</th>
<th>Toner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample status</td>
<td></td>
</tr>
<tr>
<td>Measuring items</td>
<td>Fluorine (F), Chlorine (Cl), Sulfur (S)</td>
</tr>
<tr>
<td>Measurement principle</td>
<td>Sample is thermally decomposed in argon (Ar) atmosphere, then combusted in oxygen (O₂) atmosphere. Halogens in the sample are converted to hydrogen halide and halogen gas and sulfur turns into sulfur oxide. These components are collected into absorbing solution and converted to halide ion and sulfate ion. The resulting solution is analyzed by injecting into an ion chromatograph (IC).</td>
</tr>
</tbody>
</table>

**Analyzing flow**

[Sample weighing]→[Combustion]→[Collection of combustion gas]→[IC analysis]

<table>
<thead>
<tr>
<th>Parameters</th>
<th>1. AQF-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>30mg</td>
</tr>
<tr>
<td>Sample boat</td>
<td>Ceramic sample boat, SXSMBS</td>
</tr>
<tr>
<td>Additive</td>
<td>None</td>
</tr>
<tr>
<td>Pyrolysis tube</td>
<td>Quartz tube filled with quartz wool</td>
</tr>
<tr>
<td>Absorbent</td>
<td>Hydrogen peroxide / water</td>
</tr>
<tr>
<td>Heater Temp. Inlet</td>
<td>900degC</td>
</tr>
<tr>
<td>Outlet</td>
<td>1000degC</td>
</tr>
<tr>
<td>Gas flow Ar</td>
<td>200 ml/min</td>
</tr>
<tr>
<td>O₂</td>
<td>400 ml/min</td>
</tr>
</tbody>
</table>

| GA-100 | Absorbent volume | 5 ml |
| Sampling loop | 100 ul |
| Absorption tube | For 10 ml |
| Water supply | 2 |
| Ar flow for water supply | 150 ml/min |
2. Ion chromatograph
Ion chromatograph  : DIONEX ICS-1500
Column            : DIONEX Ion Pack AG12A / Ion Pack AS12A
Eluent            : 2.7mM Na₂CO₃ / 0.3mM NaHCO₃
Eluent flow       : 1.50ml / min
Detector          : Conductivity
Suppressor        : ASRS-mm
Measuring time    : 15min
Sampling loop     : 100 ul using GA-210 sampling loop
Calibration       : F Cl Br S : 0.1 ppm to 5.0 ppm

Results

<table>
<thead>
<tr>
<th></th>
<th>F(ppm)</th>
<th>Cl(ppm)</th>
<th>S(ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=1</td>
<td>467</td>
<td>58.6</td>
<td>1560</td>
</tr>
<tr>
<td>2</td>
<td>462</td>
<td>54.6</td>
<td>1580</td>
</tr>
<tr>
<td>Average</td>
<td>465</td>
<td>56.6</td>
<td>1570</td>
</tr>
</tbody>
</table>

Remarks
*Handling of reagents: Confirm labels and safety data sheets of reagents and handle them with enough care.
*Automation is possible by using an Automatic Sample Changer, ASC-120S.
*When ASC-120S is used, the boat to be used will be a ceramic boat, TX3SCX.

*This application sheet is provided as reference, and does not assure the measurement results. Please consider analysis environment, external factors and sample nature for optimal conditions before the measurement.

AQF100_12_001E

http://www.mccat.co.jp/