

Determination of fluorine in toothpaste

Seat №.: **AQF_ME_007E** Category :
 Instruments: **AQF-100**
 Method : Combustion-ion chromatography
 Related standard

It is critically important to know the fluorine content in toothpaste as component analysis for quality control. Concentrations of fluorine, chlorine, bromine, iodine, and sulfur can be determined and accurately by using a combustion ion chromatography (CIC) system combining an Automatic Quick Furnace Model AQF-100 which safely combusts samples with an ion chromatograph.

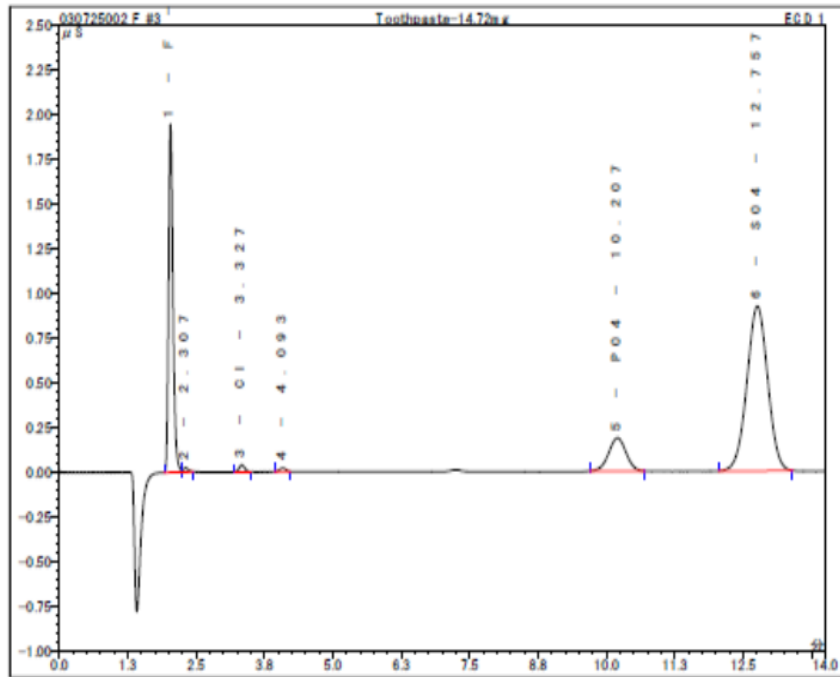
| Sample name | Toothpaste | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|---|-----|-----|-----|-----|-----|-----|------|-----|------|----------|------|---|--|--|--|--|--|--|------|-------|---|--|--|--|--|-----|----|-------|----------|--|--|--|--|--|--|--|
| Sample status | Paste | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measuring items | Fluorine (F) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement principle | <p>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).</p> <p>Analyzing flow [Sample weighing] ⇒ [Combustion] ⇒ [Collection of combustion gas] ⇒ [IC analysis]</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parameters | <p><u>1.AQF-100</u></p> <p> Sample size : 20mg Sample boat : Ceramic sample boat, SXSMBS Additive : WO₃ 50mg Pyrolysis tube : Quartz tube filled with quartz wool Absorbent : 0.1% Hydrogen peroxide / water Mode : </p> <p> Heater Temp. Inlet : 900degC Outlet : 1000degC Gas flow Ar : 200 ml/min O₂ : 400 ml/min </p> <p> GA-100 Absorbent volume : 20 ml Sampling loop : 20 ul Absorption tube : For 20 ml Water supply : 4 Ar flow for water supply : 150 ml/min </p> <p>ABC-100/ASC-120S</p> <table border="1"> <thead> <tr> <th></th> <th></th> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> <th>5th</th> <th>End</th> <th>Cool</th> </tr> </thead> <tbody> <tr> <td>Position</td> <td>(mm)</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Time</td> <td>(sec)</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td>360</td> <td>30</td> </tr> <tr> <td>Speed</td> <td>(mm/sec)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p style="text-align: right;">Ar Time 0 (sec) O₂ Time 600(sec)</p> | | | 1st | 2nd | 3rd | 4th | 5th | End | Cool | Position | (mm) | 0 | | | | | | | Time | (sec) | 0 | | | | | 360 | 30 | Speed | (mm/sec) | | | | | | | |
| | | 1st | 2nd | 3rd | 4th | 5th | End | Cool | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Position | (mm) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Time | (sec) | 0 | | | | | 360 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Speed | (mm/sec) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2. Ion chromatograph

Ion chromatograph : DIONEX DX-320
 Column : DIONEX Ion Pack AG12A / Ion Pack AS12A
 Eluent : 2.7mM Na₂CO₃ / 0.3mM NaHCO₃
 Eluent flow : 1.50ml / min
 Detector : Conductivity
 Suppressor : AAES(Atlas)
 Measuring time : 15min
 Sampling loop : 20 ul using GA-100 sampling loop
 Calibration : F Cl Br S : 5ppm to 40ppm

Results

Chromatogram



Results

Fluoride in sample: Na₂FPO₂

| Indicated value (%) | Results (%) |
|---------------------|--------------|
| 0.15% | 0.142, 0.143 |

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.