

Determination of bromine in plastic

 Seat №.: **AQF_PT_004E** Category : Plastic

 Instruments: **AQF-100**

Method : Combustion-ion chromatography

Related standard

For plastics which contain flame retardant, it is important to know the Bromine content as a main component.

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.

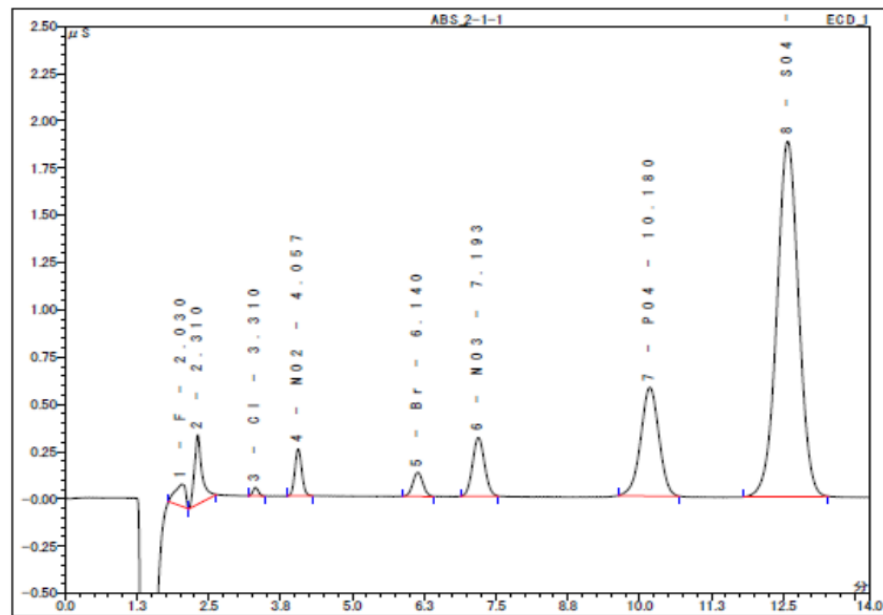
Sample name	Acrylonitrile-Butadiene-Styrene resin (ABS resin) Polyethylene resin																																				
Sample status																																					
Measuring items	Bromine (Br)																																				
Measurement principle	<p>Sample is thermally decomposed in argon (Ar) 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>1. AQF-100</p> <p>Sample size : 20mg Sample boat : Ceramic boat, SXSMBS Additive : Not used Pyrolysis tube : Quartz tube filled with quartz wool Absorbent : Hydrogen peroxide / water</p> <p>Heater Temp. Inlet : 900degC Outlet : 1000degC Gas flow Ar : 200 ml/min O₂ : 400 ml/min</p> <p>GA-100 Absorbent volume : 10 ml Sampling loop : 100 ul Absorption tube : For 10 ml Water supply : 1 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>140</td> <td>150</td> <td>160</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Time</td> <td>(sec)</td> <td>120</td> <td>120</td> <td>120</td> <td></td> <td></td> <td>300</td> <td>60</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)	140	150	160					Time	(sec)	120	120	120			300	60	Speed	(mm/sec)							
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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 : 100 ul using GA-100 sampling loop
 Calibration : F Cl Br S : 0.1ppm to 5.0ppm

Results

Chromatogram



Results

Sample	Concentration (%)	Br (%)	DBDE corresponding value
DBDE / ABS A	0.1	0.089	0.11
DBDE / ABS B	1.0	0.87	1.04
DBDE / ABS C	10.0	8.24	9.9
DBDE / PE A	0.1	0.079	0.096
DBDE / PE B	6.0	4.93	5.91

DBDE: Decabromodiphenylether

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.