

Sheet No.

**AQF EM 012E** Materials

# Determination of chlorine, bromine, and sulfur in solder materials ( 2 )

1/2

Instruments : AQF-100  
 Method : Combustion-ion chromatography  
 Related standard : JETA ET-7304A Definition of Halogen-Free Soldering Materials

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	Flux and paste																																											
Sample status																																												
Measuring items	Chlorine (Cl), Bromine (Br), Sulfur (S)																																											
Measurement principle	<p>Sample is thermally decomposed in argon (Ar) atmosphere, then combusted in oxygen (O<sub>2</sub>) 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><b>Analyzing flow</b>                  [Sample weighing]→[Combustion]→[Collection of combustion gas]→[IC analysis]</p>																																											
Parameters	<p><b>1. AQF-100</b></p> <p>Sample size : 50 to 100mg                  Sample boat : Ceramic sample boat, SXSMBS                  Additive : WO<sub>3</sub>                  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                  O<sub>2</sub> : 400 ml/min</p> <p>GA-100 Absorbent volume : 10 ml                  Sampling loop : 100 ul                  Absorption tube : For 10 ml                  Water supply : 2                  Ar flow for water supply : 100 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>100</td> <td>160</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Time</td> <td>(sec)</td> <td>90</td> <td>90</td> <td></td> <td></td> <td></td> <td>300</td> <td>60</td> </tr> <tr> <td>Speed</td> <td>(mm/sec)</td> <td>10</td> <td>0.12</td> <td></td> <td></td> <td></td> <td>20</td> <td>40</td> </tr> </tbody> </table> <p style="text-align: right;">Ar Time 0 (sec) O<sub>2</sub> Time 300 (sec)</p>										1st	2nd	3rd	4th	5th	End	Cool	Position	(mm)	100	160						Time	(sec)	90	90				300	60	Speed	(mm/sec)	10	0.12				20	40
		1st	2nd	3rd	4th	5th	End	Cool																																				
Position	(mm)	100	160																																									
Time	(sec)	90	90				300	60																																				
Speed	(mm/sec)	10	0.12				20	40																																				

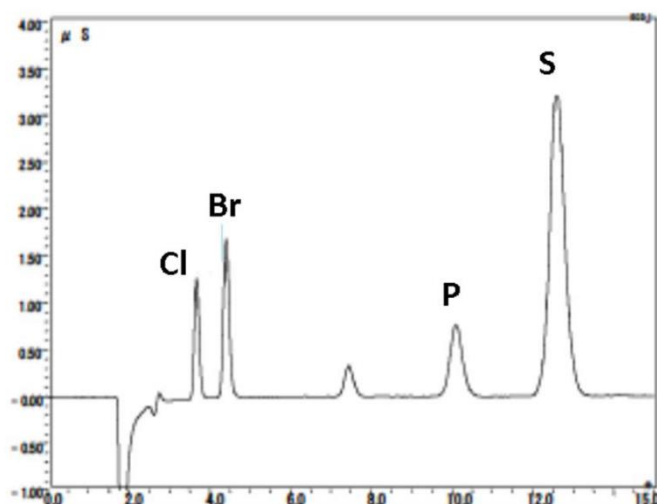
Sheet No.

**AQF EM 012E Determination of chlorine, bromine, and sulfur in solder materials (2) 2/2**

2. Ion chromatograph  
 Ion chromatograph : DIONEX ICS-1500  
 Column : DIONEX Ion Pack AG12A / Ion Pack AS12A  
 Eluent : 2.7mM Na<sub>2</sub>CO<sub>3</sub> / 0.3mM NaHCO<sub>3</sub>  
 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 :0.1ppm ~ 5.0ppm

Results

**Chromatogram**



**Results**

		( ppm )				
Sample	Item	1	2	3	Average	RSD(%)
Flux	Cl	13.7	13.7	13.3	13.6	1.50
	Br	<5	<5	<5	<5	-
	S	58.5	59.0	56.1	57.9	2.7
Paste	Cl	1.65	1.55	1.67	1.62	4.0
	Br	<5	<5	<5	<5	-

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\_06\_003E