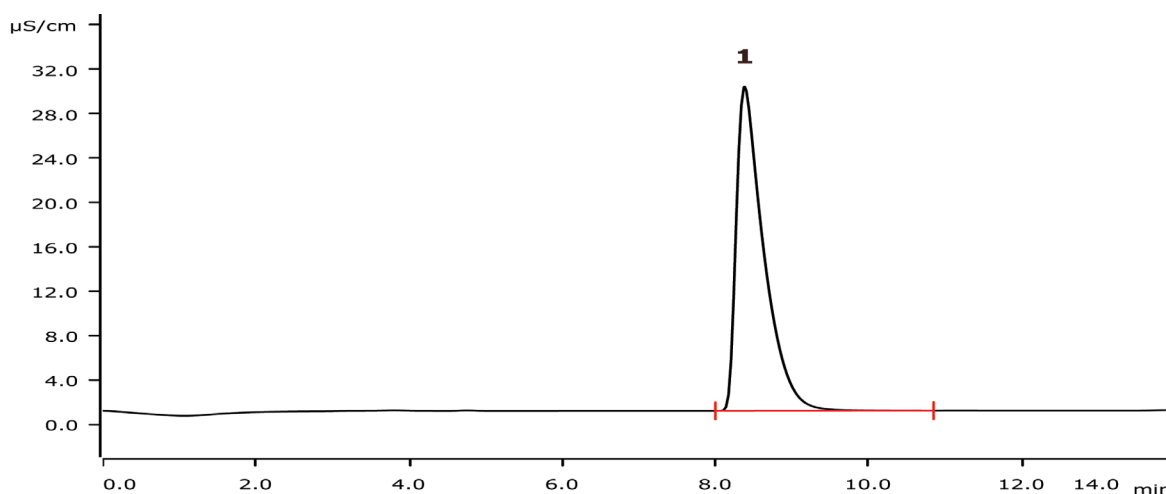


# Bromine content in polystyrene – optimization of the absorption solution for Combustion IC



Polystyrol is brominated to increase flame retardation. The brominated polystyrene finally consists of 25 to 35% of bromine. The determination of bromine by combustion ion chromatography (CIC) requires a specially optimized absorption solution to trap all bromide. This work shows the optimization of the absorption solution for high-bromine samples.

## Results

1 Bromine	NaOH [0 mol/L]	NaOH [10 mol/L]	NaOH [20 mol/L]	NaOH [30 mol/L]
Change in NaOH (400 mg/L H <sub>2</sub> O <sub>2</sub> )	241.0 g/kg RSD = 4.9%	287.6 g/kg RSD = 3.6%	287.6 g/kg RSD = 1.5%	283.8 g/kg RSD = 1.8%
	H <sub>2</sub> O <sub>2</sub> [100 mg/L]	H <sub>2</sub> O <sub>2</sub> [200 mg/L]	H <sub>2</sub> O <sub>2</sub> [400 mg/L]	H <sub>2</sub> O <sub>2</sub> [800 mg/L]
Change in H <sub>2</sub> O <sub>2</sub> (20 mmol/L NaOH)	288.2 g/kg RSD = 2.8%	270.6 g/kg RSD = 2.0%	281.5 g/kg RSD = 1.8%	284.8 g/kg RSD = 2.9%

## Sample

Brominated polystyrene

## Sample preparation

The sample is analyzed by Combustion IC with flame sensor technology and intelligent Partial Loop Injection Technique with Inline Matrix Elimination.

## Columns

Metrosep A Supp 16 - 100/4.0	6.1031.410
Metrosep A Supp 4/5 Guard/4.0	6.1031.500
Metrosep A PCC 1 HC/4.0	6.1006.310
Metrosep A Trap 1 - 100/4.0	6.1014.000
Metrosep I Trap 1 - 100/4.0	6.1014.200

## Solutions

Eluent	7.5 mmol/L sodium carbonate 0.75 mmol/L sodium hydroxide
Suppressor regenerant	250 mmol/L sulfuric acid
Rinsing solution	STREAM
Absorber solution	100 - 800 mg/L hydrogen peroxide 0 - 30 mmol/L sodium hydroxide

## Parameters

Flow rate	0.7 mL/min
Injection volume (IC)	10 µL (MiPT)
P <sub>max</sub>	15 MPa
Recording time	14 min
Column temperature	45 °C

## Combustion parameters

Argon	100 mL/min
Oxygen	300 mL/min
Oven temperature	1050 °C
Post-combustion time	600 s
Initial volume of absorption solution	4.0 mL
Water inlet	0.2 mL/min

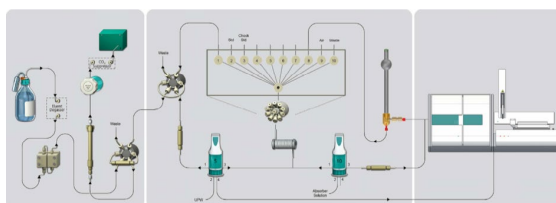
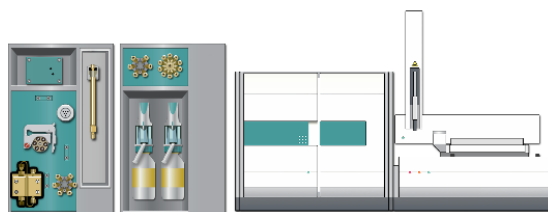
## Analysis

Conductivity after sequential suppression

## Instrumentation

930 Compact IC Flex Oven/SeS/PP/Deg	2.930.2560*
IC Conductivity Detector	2.850.9010*
MSM Rotor A	6.2832.000*
Adapter sleeve for Suppressor Vario	6.2842.020*
920 Absorber Module	2.920.0010*
Combustion Module (oven and ABD)	2.136.0700*
Autosampler MMS 5000	2.136.0800
Kit for solid sampling	6.7302.000

\* available as 930 Metrohm Combustion IC (2.930.9010)



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