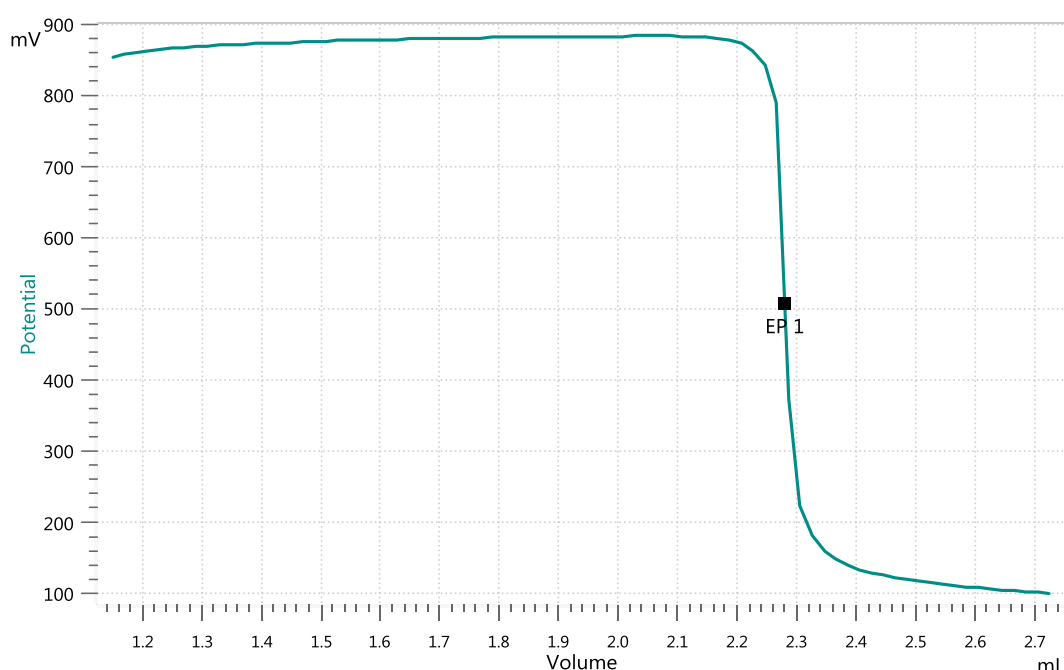


# Determination of bromine index of petroleum hydrocarbons according to ASTM D2710 and IP 299



The bromine index is an important parameter for the determination of aliphatic C=C double bonds in petroleum hydrocarbons. For the titration a solvent mixture of glacial acetic acid, methanol and dichloromethane is used. In this application note the chlorinated solvent was replaced with toluene. The bromine is generated in-situ from a bromide/bromate solution and usually determined using electrochemical titration at 5 °C.

Using the double Pt-wire electrode for indication, the bromine index is determined by titration with bromide/bromate solution as titrant.

# Method description

## Sample

Heptane

Cyclohexene

## Sample preparation

No sample preparation is required.

## Configuration

OMNIS Advanced Titrator with magnetic stirrer	2.1001.0220
OMNIS Dosing module	2.1003.0010
Titration vessel with thermostat jacket / 50-150 mL	6.1418.250
Titration vessel lid with 5 openings	6.1414.010
Lauda RE 304 circulation thermostat bath	-
Lauda E 300 immersion thermostat	-
OMNIS 5 mL cylinder unit	6.03001.150
OMNIS 50 mL cylinder unit	6.03001.250
Analog measuring module	6.02101.010
Cable MDL PL/SO 1 m	6.02102.020
Electrode cable plug-in head G (pol.) / plug P, 0.55 m	6.02104.040
Electrode cable plug-in head G (temp.) / plug P, 0.55 m	6.02104.020
Stirring propeller 30 mm ETFE	6.01900.010
OMNIS Stand-alone license (including one instrument license)	6.06003.010
Double Pt-wire electrode for coulometry	6.0341.100
Pt1000 temperature sensor	6.1110.100

## Solutions

Titrant	$c(\text{Br}_2) = 0.025 \text{ mol/L}$ $w(\text{KBr}) = 0.51\%$ and $w(\text{KBrO}_3) = 0.14\%$ in deionized water, if possible this solution should be bought from a supplier
Titration solvent	714 mL glacial acetic acid, 134 mL toluene, 134 mL methanol and 18 mL $w(\text{H}_2\text{SO}_4) = 16.7\%$ are added into a 1000 mL glass flask and mixed well.

## Analysis

### Blank

The blank is determined the same way as the sample, just without sample.

### Sample

110 mL titration solvent and an appropriate amount of sample (see table below) are added into a titration vessel. While stirring, the solution is cooled down to  $0 - 5 \text{ }^\circ\text{C}$ . The solution is then titrated with  $c(\text{Br}_2) = 0.025 \text{ mol/L}$  until after the equivalence point.

Expected bromine index in mg bromine/100 g sample	Sample weight in g
100 – 500	8 to 10
> 500 – 1000	4 to 8

## Parameters

Mode	MET lpol
Pause	60 s
Start volume	0 mL
Stirring rate	15
Signal drift	Off
Min. waiting time	30 s
Max. waiting time	30 s
Volume increment	0.020 mL
I(pol)	1.0 $\mu\text{A}$
Stop volume	Off
Stop measured value	100 mV
Stop EP	Off
EP criterion	30 mV
EP recognition	Greatest

## Results

Sample (n = 6)	Bromine index in mg bromine/100 g sample	s(rel) /%
Heptane	0.66	0.4
Cyclohexene	90.61	0.7

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