

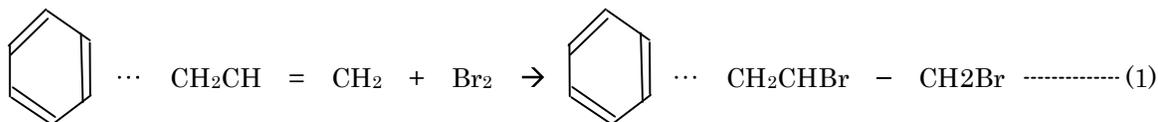
AQUACOUNTER Application Sheet	COM series	DATA No.L10	1st edition
Petroleum Products		Measurement of bromine index in aromatic compounds	

1. Measurement outline

Measurement of bromine index is stipulated in JIS K 2435 as a product evaluation test on aromatic compounds (benzene, toluene, xylene, etc.). Measurement of bromine index is an indicator for the concentration of unsaturated bond components (compounds with double or triple bonds) contained in products, and it is expressed as the “mg value of bromine consumed for 100g of sample” when it reacts under the specified conditions. Furthermore, JIS K 2605 for bromine value measurement on olefins is stipulated as a similar measurement. It shall be used for reference.

This section introduces an example in which the bromine index for an aromatic compound was measured according to JIS K 2435 using constant-current potentiometric titration method with dual platinum electrode for end point detection method and titration solvent that does not contain reaction catalyst (mercury chloride) instead of potentiometric titration by glass-platinum electrode.

In this measurement, the sample is collected in a glass syringe and is added and dissolved well in 100mL titration solvent. Electrodes are then immersed for titration with 1/300mol/L potassium bromide-potassium bromate titrant at room temperature.



2. Reagents and Electrodes

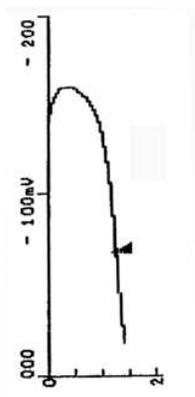
(1) Reagents	Titrant	1/300mol/L potassium bromide-potassium bromate titrant	
	Titration solvent	Acetic acid 704mL Carbon tetrachloride 134mL 10mL potassium bromide solution (300g/L) Sulfuric acid (1+5) 18mL	} 100mL per measurement
(2) Electrodes	Twin Platinum electrode TPT-351 (P/N D231246-A) *P-2000 standard accessory		
	Polarization current	1μA	

3. Measurement conditions example (COM-1600P w/ Polarization titration unit)

Master File No.1	
Condition file: 1	
Parameters for Condition file 1	
Method	AUTO
Buret No.	1
Meas Unit	mV
S-Timer	10 sec
CP mL	0 mL
DP mL	0 mL
Direction	N/A
End Sens	200
Over mL	0.10 mL
Max Vol	40 mL
Mode No.	12
Unit	N/A
Formula	$(D-B) \times F \times M \times 7990/S$
Blank	Blank measurement value
Molarity	0.02
Factor	Titre of the titrant
K	79.900 (as Br)

Mode No.12	
Pre Int	30 sec
Del K	0
Del Sens	0 mV
Int Time	20 sec
Int Sens	0 mV
Brst Speed	2
Pulse	40

4. Measurement example



Measurement results on bromine index for aromatic compounds

Sample No.	Sample volume (g)	Titration value (mL)	Bromine index
1	5.5470	1.3472	33.722
2	5.2130	1.2457	32.908
Avg.		33.315 Bromine index	

5. Outline

(1) Various titration methods for measurement of bromine index

The following methods are possible as titration methods on bromine index using electrodes:

- ① Potentiometric titration method (also called zero-current potentiometric titration method since polarization current is not applied)
- ② Constant-current potentiometric titration method (polarization current is applied and change in potential difference is measured)
- ③ Constant-voltage amperometric titration method (polarization voltage is applied and change in current is measured)

This measurement used ② Constant-current titration method. In potentiometric titration method, the titration end point tends to become unclear. In general, it is safe to measure the bromine index using ② Constant-current potentiometric titration method based on our past experience.

(2) The relationship between bromine addition reaction speed and sample

In general, reciprocal movement in potential occurs frequently as titration approaches the end point in bromine index, and it is assumed that the bromine addition reaction is relatively slow. Therefore, this makes the end point detection difficult, while the titration value fluctuates back and forth depending on the titrant dropping control near the end point. It is inevitable for the bromine index to fluctuate depending on the measurement conditions, it is important that measurement be always taken under the identical conditions in quality control analysis, etc.

Key words

Bromine index, aromatic compounds, constant-current potentiometric titration

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