

Sheet No.

**GT200-OF033E** Oil

## Determination of bromine index of aromatic hydrocarbon — 1/4

Method	: Polarization titration
Apparatus	: Automatic Titrator Model GT-200 (GT0EF) Electrodes: Double platinum electrode (GTRE10B) *Optional unit 1) Analog pack PS board for polarization and conductivity (GTEPSK) 2) Cooling jacket for tall beaker
Titration mode	: INF, Detection: mV, Differential polarographic titration/IPOL, Applied voltage: 300mV
Related standard	: ASTM 5776-07 Standard Test Method for Bromine Index of Aromatic Hydrocarbons by Electrometric Titration

\*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.

### Outline

A bromine number is a number which expresses the content of unsaturated components contained in petroleum or the like by the number of grams of bromine added to unsaturated components in a 100g sample (gBr<sub>2</sub>/100g). A bromine index is an index which expresses 1 gBr<sub>2</sub>/100g of a bromine number as a bromine index 1000, which corresponds to the number of milligrams of bromine added to unsaturated components.

### Reagents

[ Titrant ]

■0.05mol/L (N/10)-bromine solution (Volumetric analysis grade/Commercial item)

[ Titration solvent ]

Mixture of 714ml of acetic acid (Special grade), 134ml of 1-Methyl-2-pyrrolidinone, 134ml of methanol and 18ml of sulfuric acid (Sulfuric acid:Water = 1:5)

### Analytical Procedure

[ Blank measurement ]

- (1) Collect 150ml titration solvent using a measuring cylinder and add it into a 200ml tall beaker.
- (2) Set the above-mentioned beaker in a cooling jacket and titrate with 0.05mol/L (N/10)-bromine solution while cooling the beaker down to 0-5 degrees C using a cold water circulation device or the like.

[ Sample titration ]

- (1) Collect 30ml titration solvent using a measuring cylinder and add it into a 200ml tall beaker.
- (2) Set the above-mentioned beaker on a balance and weigh out 20g of the sample.
- (3) Collect 120ml titration solvent using a measuring cylinder and add it into the beaker.
- (4) Set the above-mentioned beaker in a cooling jacket and titrate with 0.05mol/L (N/10)-bromine solution while cooling the beaker down to 0-5 degrees C using a cold water circulation device or the like.

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[ Calculation ]

$$\text{Bromine index} = (A1 - BL) \times K1 \times 7990/S$$

A1 : Titration volume of 0.05mol/L-bromine solution at sample titration (ml)

BL : Titration volume of 0.05mol/L-bromine solution at blank measurement (ml)

K1 : Normality of bromine solution (0.1)

7990 : Atomic weight of bromine (79.90) . 100. (Converted into the value per 100g)

S : Sample volume (g)

#### Other Requirements

- Make sure to confirm labels and safety data sheets of reagents and gases used for the measurement and handle them with enough care.
- Wear protective equipment (eye protector, gloves and others) when handling reagents.
- Refer to the instruction manual of the analog pack polystyrene substrate for the setting method of applied current.
- When using a cooling jacket, put approximately 40ml of water in it as a medium. As titration is performed while cooling the water down to 0-5 degrees C, prepare a cold water circulation device or the like separately.

#### Measurement Results

	Sample size (g)	Titration volume (ml)	Bromine index
1	20.2574	5.3614	210.6
2	20.0714	5.2426	207.8
3	20.5043	5.3615	208.1

Blank:0.0218ml

Nos. of data (n) 3  
Average 208.8  
Standard deviation (SD) 1.54  
Relative standard deviation (RSD%) 0.74

Bromine indexes of aromatic hydrocarbon were measured using GT-200. The average of three measurements was 208.8 and the relative standard deviation (RSD %) was 0.74%. GT-200 can measure bromine indexes with good repeatability.

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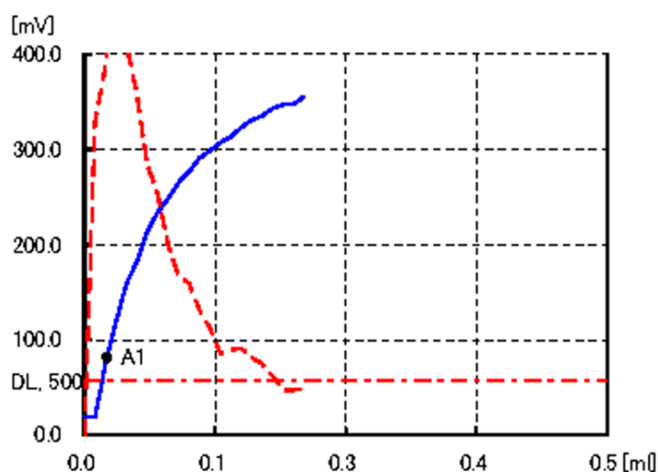
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ID No. : 6 GT No.1

User : GT-200

Measurement : 2015/05/08 14:06  
 Sample name : Titration solvent 150ml

Type : Sample Titr  
 Sample size (S) : 150 [ml]



C1 : 0.0218 [ml]

A1 : 0.0218 [ml] 82 [mV]

Initial potential (Pi) : 19 [mV]

Start : 0 [ml] 19 [mV]

End : 0.21 [ml] 355 [mV] Time : 2'39"

Run file No. : 5 Bromine index

Titration filr No. : 9 Blank of Bromine index

\*Run file and Titration file parameters are set for each analysis item

Mode : INF End1, End1 Width : 100 [mV]  $\pm$  100 [mV]

Detect : mV(P)

BRT No. : 1

Reagent : 35

WTint : 10 [sec]

Vup : 10 [ $\mu$ l]Vlow : 10 [ $\mu$ l]

dE : 3 [mV]

dT : 5 [sec]

DL : 500 [mV/ml]

DetCnt : 3

Vmax : 5 [ml]

Vover : 0.1 [ml] C1 : A1

[ml]

Reagent name (Reag) : Bromine solution

Equivalent (E) : 2

Molarity (M) : 0.05 [Mol/l]

Factor (f) : 1.005

Buret Injection Speed : 500 [ $\mu$ l/sec]

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ID No. : 1 GT No.1

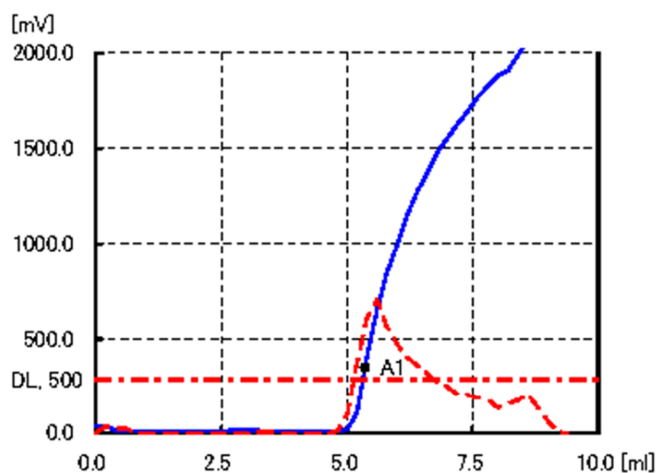
User : GT-200

Measurement : 2015/05/08 11:52

Sample name : Test sample

Type : Sample Titr

Sample size (S) : 20.2574 [g]

C1 : 210.607 [mgBr<sub>2</sub>/100g]

A1 : 5.3614 [ml] 348 [mV]

Initial potential (Pi) : 40 [mV]

Start : 0 [ml] 40 [mV]

End : 9.4 [ml] 2130 [mV] Time : 9' 0"

Run file No. : 5 Bromine index

Titration file No. : 5 Bromine index

\*Run file and Titration file parameters are set for each analysis item

Mode : INF End1, End1 Width : 500 [mV] ± 500 [mV]

Detect : mV(P)

BRT No. : 1

Reagent : 35

WTint : 10 [sec]

Vup : 200 [μl]

Vlow : 200 [μl]

dE : 3 [mV]

dT : 5 [sec]

DL : 500 [mV/ml]

DetCnt : 6

C1 : (A1-BL)\*K1\*7990/S

Vmax : 100 [ml]

Vover : 1 [ml]

Reagent name (Reag) : Bromine solution

Equivalent (E) : 2

Molarity (M) : 0.05 [Mol/l]

Factor (f) : 1.005

Blank (BL) : 0.0218 [ml]

Coefficient1(K1) : 0.1

Buret Injection Speed : 500 [ul/sec]