

Sheet No.

**GT200-DE034E Oil**

## Quantitative determination of cationic surfactant 1/4

Method : Acid-base titration  
 Apparatus : Automatic Titrator model GT-200 (GT0EF)  
                   Electrodes:Reference electrode, double junction (GTRE10B)  
                   \*Inner solution:1mol/l Potassium chloride  
                   \*Outer solution:1mol/l Potassium nitrate  
                   Electrode for detergent (GTSS11B)  
 Titration mode : INF, Detection: pH / mV  
 Related standard : JISK3362-2008 Test Method of Household Synthetic,  
                   Detergent/Qualitative and quantitative analysis of cationic surfactant

\*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

Hydrophilic groups of cationic surfactants are positively charged when cationic surfactants are dissolved in water and they are absorbed to negatively-charged substances. Cationic surfactants have softening, bactericidal and antistatic properties, being used for products such as hair washing agents, fabric softeners and disinfectants.

### Reagents

[Titrant] ■0.004mol/L-sodium lauryl sulfate in water

### Analytical Procedure

- (1) Dilute 2g sample (cationic surfactant) with pure water to 1L total. Use this solution as a sample solution.
- (2) Collect 10ml sample solution using a whole pipette and add it into a 100ml beaker.
- (3) Add approximately 60ml pure water. (A quantity which makes a surfactant electrode immerse in the water)
- (4) Titrate with 0.004mol/L-sodium lauryl sulfate solution while agitating.
- (5) Perform a blank measurement in the same way

[ Calculation ]

**Cationic surfactant (%) = (A1 - BL) x M x f x FW x 10/S**

A1 : Titration volume of 0.004mol/L-sodium lauryl sulfate solution at sample titration (ml)  
 BL : Titration volume of 0.004mol/L-sodium lauryl sulfate solution at blank measurement (ml)  
 M : Molar concentration of 0.004mol/L-sodium lauryl sulfate solution  
 f : Factor of 0.004mol/L-sodium lauryl sulfate solution  
 FW : Formula weight of sample (cationic surfactant)  
 10 : Unit conversion factor  
 S : Sample volume (g)

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### 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.
- Conditioning of an electrode is required when a surfactant electrode is used. For the conditioning method, refer to the instruction manual for the surfactant electrode.

### Measurement Results

	Sample size (g)	Titration volume (ml)	Results (%)
1	2.0372	11.0723	97.6
2		11.1055	97.9
3		11.0579	97.5

Blank: 0.3237ml

Nos. of data	(n)	3
Average		97.7
Standard deviation	(SD)	0.22
Relative standard deviation	(RSD%)	0.23

Determinate quantities of cationic surfactant were measured using GT-200. The average of three measurements was 97.7% and the relative standard deviation (RSD %) was 0.23%. GT-200 can measure determinate quantities with good repeatability.

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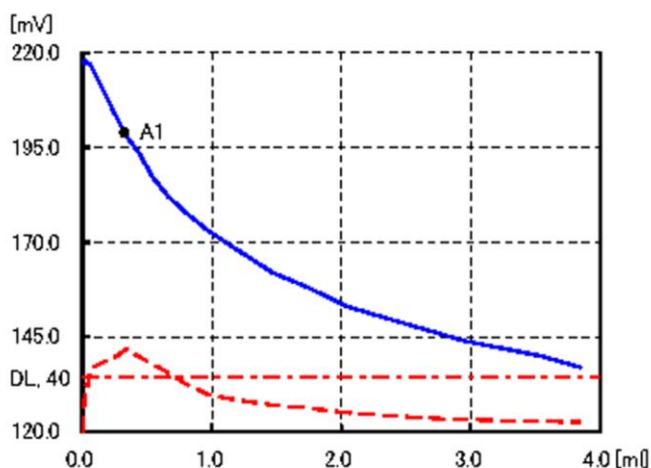
**GT200-DE034E** Quantitative determination of cationic surfactant 3/4

ID No. : 4 GT No.1

User : GT-200

Measurement : 2015/05/26 15:15  
 Sample name : Blank test

Type : Sample Titr  
 Sample size(S) : 1 [g]



C1 : 0.3237 [ml]

A1 : 0.3237 [ml] 199 [mV]

Initial potential (Pi) : 217 [mV]			
Start : 0 [ml]	217 [mV]		
End : 3.848 [ml]	137 [mV]	Measurement Time : 1'57"	

Run file No. : 11 Concentration of surfactant

Titration file No.: 38 Concentration of surfactant

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

Mode : INF End1, End1 Width : 300 [mV] ± 200 [mV]

Detect : mV1

BRT No. : 1

Reagent : 37

WTint : 10 [sec]

Vup : 300 [μl]

Vlow : 20 [μl]

dE : 5 [mV]

dT : 5 [sec]

DL : 40 [mV/ml]

DetCnt : 3

Vmax : 50 [ml]

Vover : 0.5 [ml] C1 : A1

[ml]

Reagent (Reag): SDS

Equivalent (E) : 1

Molarity(M) : 0.004 [Mol/l]

Factor(f) : 1

Buret Injection Speed : 400 [ul/sec]

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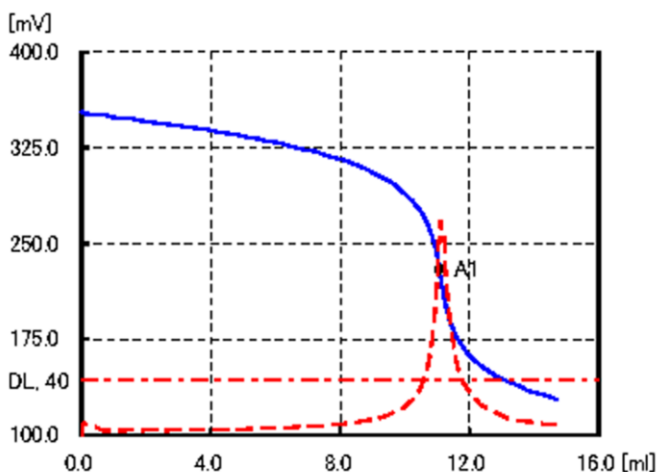
**GT200-DE034E** Quantitative determination of cationic surfactant 4/4

ID No. : 1 GT No.1

User : GT-200

Measurement : 2015/05/26 14:22  
 Sample name : Cation surfactant

Type : Sample Titr  
 Sample size(S) : 2.0372 [g]



C1 : 97.59 [%]

A1 : 11.0723 [ml] 230 [mV]

Initial potential (Pi): 353 [mV]

Start : 0 [ml] 353 [mV]

End : 14.698 [ml] 128 [mV]

Measurement Time : 6'32"

Run file No. : 11 Concentration of surfactant

Titration file No. : 38 Concentration of surfactant

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

Mode : INF End1, End1 Width : 300 [mV] ± 200 [mV]

Detect : mV1

BRT No. : 1

Reagent : 36

WTint : 10 [sec]

Vup : 300 [μl]

Vlow : 20 [μl]

dE : 5 [mV]

dT : 5 [sec]

DL : 40 [mV/ml]

DetCnt : 20

C1 : (A1-BL)\*M\*f\*FW\*10/S

Vmax : 50 [ml]

[%]

Vover : 0.5 [ml]

Reagent name (Reag) : SDS

Equivalent (E) : 1 Molarity(M) : 0.004 [Mol/l]

Factor(f) : 1.032

Blank (BL) : 0.3237 [ml]

Formula weight (FW) : 448.09

Buret Injection Speed : 400 [ul/sec]