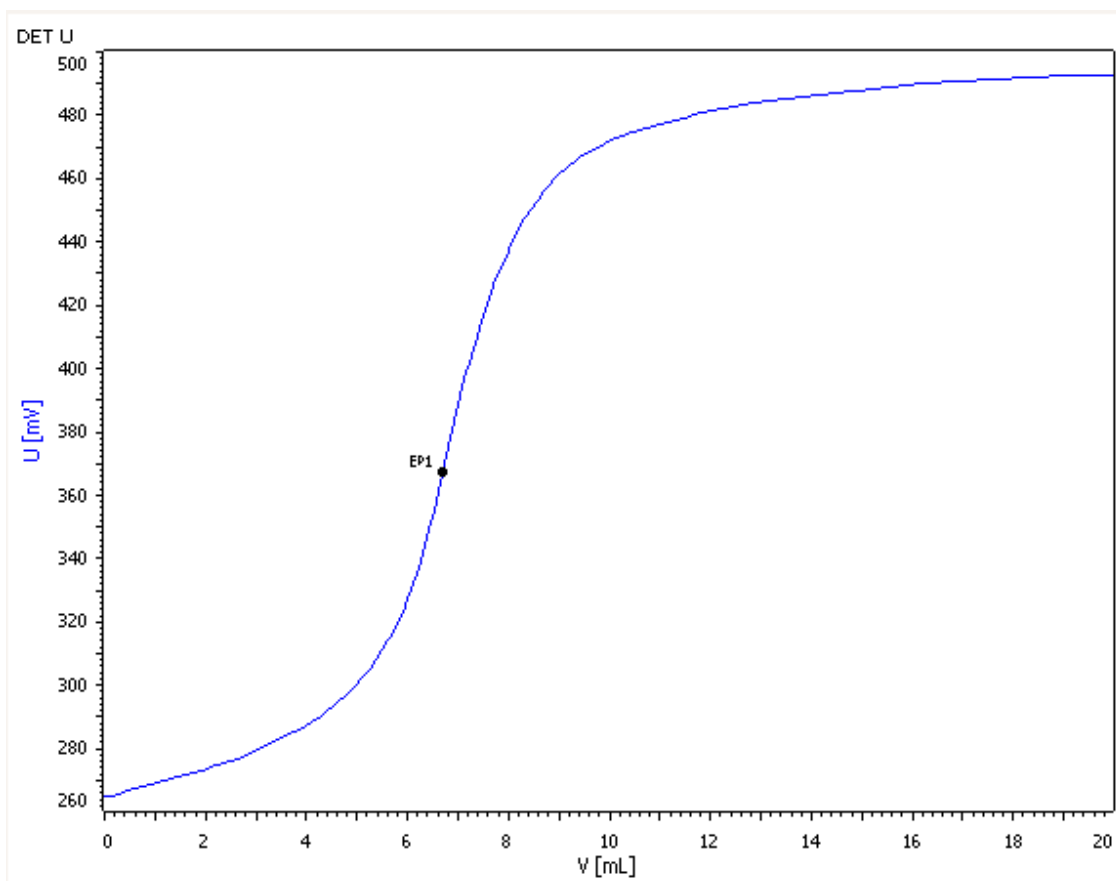


Titration Application Note T-156

Sugar-based and polyoxyethylene surfactants



Alkyl glycosides, alkyl maltosides, and compounds with polyoxyethylene (POE) groups belong to nonionic surfactants. These surfactants can be analyzed with a standard titration against TEGO®trant after derivatization (i.e., sulfonation).

Method description

Sample

Hypoallergenic hand washing soap

Lutensol® AO3, 100%, Molar mass: ~340 g/mol

Lutensol® AO7, 100%, Molar mass: ~520 g/mol

Octyl β -D-glucopyranoside 98%

n-Dodecyl β -D-maltoside, $\geq 98\%$

Sample preparation

A sample amount of 2 g is weighed into a round bottom flask and diluted with 5 mL DMF. This solution is then dried at a rotary evaporator. 10 mL of dry DMF is added and the freshly prepared derivatization solution is added for sulfonation of the hydroxyl groups of the sample. After 3 minutes, the solution is adjusted to pH 3–7 with 5–10 mL $c(\text{NaOH}) = 1 \text{ mol/L}$. The solution is then quantitatively transferred to a 100 mL volumetric flask and filled up to the mark with dist. water.

Instruments

814 USB Sample Processor	2.814.0020
907 Titrand	2.907.0020
802 Stirrer for Sample Changer	2.802.0020
Dosing Unit 20 mL, 3x	6.3032.220
Dosing Unit 5 mL	6.3032.150
800 Dosino, 4x	2.800.0010
3-way stopper with antidiff. valve	6.1543.210
Sample rack 14 x 200 mL	6.2041.370
Disposable PP sample beaker	6.1459.310

Electrodes

Ionic Surfactant electrode	6.0507.120
Reference signal taken from Viscotrode with 6.2106.060 cable	6.2106.060
Viscotrode	6.0239.100
Surfactrode Refill	6.0507.140

Solutions

TEGO®trant A 100 $c = 0.005 \text{ mol/L}$	2.01 g TEGO®trant is weighed into a 1 L measuring flask and made up to the mark with dist. water.
Derivatization solution	1 g of sulfur trioxide N,N-dimethylformamide complex is dissolved in 10 mL dry DMF

Solvent MIBK/EtOH $\Phi(\text{EtOH}) = 50\% \text{ v/v}$	500 mL methylisobutylketone is mixed with 500 mL ethanol
DMF	Dimethylformamide (DMF) is dried over molecular sieve
Methanol	$> 99.5\%$
TEGO add	6.2317.110 or 6.2317.100

Analysis

Measurements with the Ionic Surfactant electrode (IS)

An appropriate amount of derivatized sample (1.5–3 mL) is added to a disposable beaker. The sample is diluted with approx. 100 mL dist. water and the pH is adjusted to 4. Finally, 5 mL methanol is added and a DET titration with $c(\text{TEGOtrant}) = 0.005 \text{ mol/L}$ is performed until after the equivalence point.

Measurements with Surfactrode Refill (SR)

An appropriate amount of sample solution (1.5–3 mL) is added to a disposable beaker. The sample is diluted with approx. 100 mL dist. water and the pH is adjusted to 4. Finally, 20 mL solvent and 0.2 mL TEGO add are added and then a DET titration with $c(\text{TEGOtrant}) = 0.005 \text{ mol/L}$ is performed until after the equivalence point.

Parameters

	IS	SR
Mode	DET U	DET U
Pause	30 s	45 s
Max. waiting time	26 s	120 s
Measuring point density	2	0
Min. increment	10 μL	150 μL
EP criterion	10	5
EP recognition	all	all

Results

Sample	mmol/100 g surfactant	Purity [%]	RSD [%]
Soap (n = 3)	81.2	-	0.92
AO3 (n = 3)	314.3	106.9	1.05
AO7 (n = 3)	198.5	103.2	1.07
Pyranoside (n = 6)	366.7	102.0	0.40
Maltenoside (n = 3)	197.6	100.9	0.39

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