Titer determination of Hyamin 1622

Description

This application report describes the general procedure for the titer determination of Hyamin 1622 solution for surfactant titration. It is also applicable to other cationic titrants like Cetylpyridinium chloride.
The titer determination in this application is done at pH 3, a common pH value for the titration of anionic surfactants (this pH avoids the titration of soaps together with the anionic surfactant). If the sample titration is done at a different pH with another buffer, this pH can also be used for the titer determination. It is also possible without any buffer.
The addition of Triton X solution is not necessary, but recommended, because it disperses the sticky reaction product of Hyamin 1622 and SDS and keeps he electrodes clean.
The titer is a dimensionless number of approximately 1 for correcting the specified concentration. In the software of the titration devices and the application reports from SI Analytics®, the term "titer" describes the exact concentration in mol/L and not the dimensionless factor.

Instruments

Titrator	TL 7000 or higher
Exchangeable head	WA 20
Electrode	TEN 1100
Cable	L 1 A
Reference Electrode	B 2920+, B 3920+
Cable	L 1 N
Stirrer	TM 235
Lab Accessoires	Glas beaker 150 ml

Reagents

1	Hyamine 1622 solution 0.004 – 0.01 mol/L from which the titer is to be determined
2	Sodiumdodecylsulfate (SDS) reference material
3	Triton X solution for surfactant titration
4	Buffer solution pH 3
5	Distilled water
All reagents should be in analytical grade or better.	

Titration procedure

Reagents

Sodiumdodecylsulfate (SDS) reference material is dried as described in the corresponding certificate of analysis.

Buffer solution pH 3:
8.45 g Citric acid (monohydrate) and 3.5g Sodium Chloride are weighted in a 1L - volumetric flask and dissolved in about 900 mL distilled water and 20 mL NaOH 1 mol/L are added. The pH is adjusted to pH 3.0 with NaOH 1 mol/L and the mixture is made up to 1 liter.

Handling the electrode

For cleaning the electrodes are rinsed with distilled water.
Do not use organic solvents for cleaning the TEN 1100 electrode! Organic solvents destroy this electrode.
The TEN 1100 is stored dry.
To condition the electrode before the titration, the electrode is placed in a solution of 0.5 mL SDS-solution 0.004 mol/L and 0.5 mL Hyamin 1622 0.004 mol/L in 80ml water for a few minutes.

The reference electrode B 2920+ or B 2420+ is filled with 3 mol/L KCl solution. This electrode is stored in 3 mol/l KCl.

Sample preparation

The amount of volumetric standard depends on the size of the burette and the concentration of the Titrant. The amount should be chosen so that about half of the burette volume or a little bit less is consumed. The most common is the 20 ml burette. The required quantity of SDS can be estimated according to this rule of thumb:

$$W\ [g] = 3 * Concentration[mol/L]$$

To determine the titer of a 0.004 mol/L cationic titrant, about 0.012 g SDS reference standard material are necessary. So small amounts are difficult to weigh in accurately, so you have to proceed differently:
0.5 g SDS and 50g of distilled water are exactly weighed in a beaker and the SDS is dissolved. From this solution, 1-2 g are used for the titer determination. The weight SDS used for titration is calculated in this way:

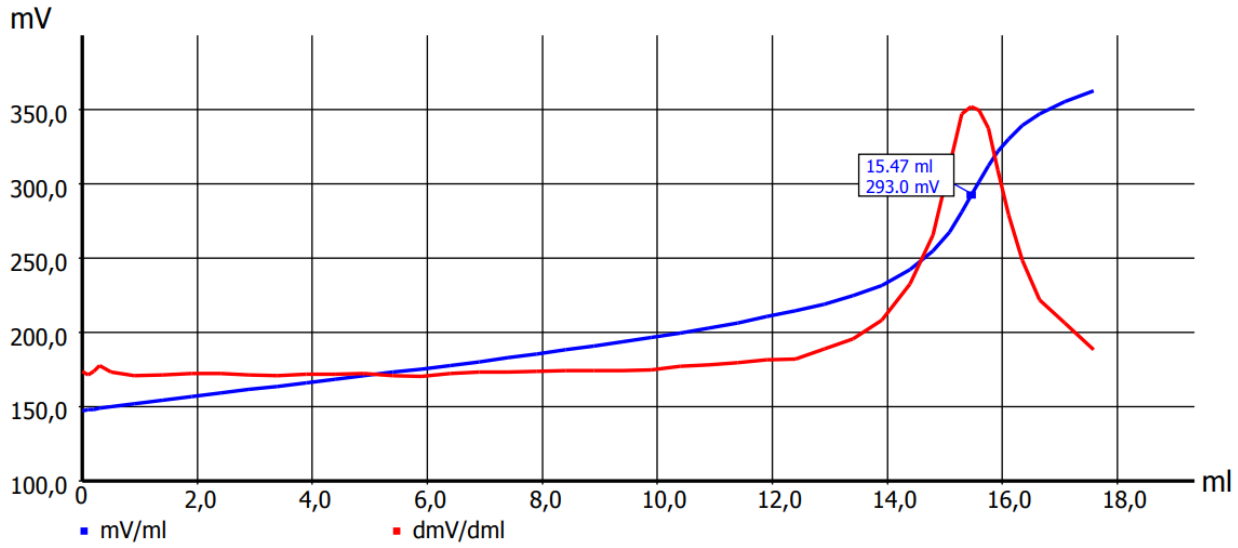
$$W = \frac{weight(SDS) * weight(used\ solution)}{weight(SDS) + weight(water)}$$

1-2g SDS solution are placed in a beaker and made up to 100 ml. 5 ml of the buffer solution pH 3 and 0.5 ml of Triton X solution are added and the mixture is titrated with the cationic titrant to an equivalence point.

The specified assay of the SDS reference material is normally significantly different from 100%, the weight for calculating the concentration must be corrected:

$$W = \frac{Weight * specified\ assay\ \%}{100}$$

Titration parameter



Default method	-		
Method type	Automatic titration		
Modus	Dynamic		
Measured value	mV		
Measuring speed / drift	User defined	Minimum holding time	8 s
		Maximum holding time	25 s
		Measuring time	4 s
		drift	3 mV/min
Initial waiting time	0 s		
Dynamic	User-defined	Max step size	0.5 mL
		Slope max ml	7
		Min. step size	0.075 mL
		Slope min. ml	50
Damping	weak	Titration direction	increase
Pretitration	off	Delay time	0 s
End value	off		
EQ	on	Slope value	80
Max. titration volume	20 mL		
Dosing speed	100%	Filling speed	30 s

A linear titration with a step size of 0.1 mL is also possible.

Calculation:

$$T\ [mol/L] = \frac{W * F2}{(EQ - B) * M * F1}$$

B	0	Blank value
W	man	Weight of the sample [g]
F2	1000	Conversion factor 2
EQ1		Consumption of titrant until first Equivalence point
M	288,37	Molecular mass of SDS
F1	1	Conversion factor 1

We recommend to write the exact concentration T to the Exchangable Unit (WA) automatically.

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