

Application Note AN-T-245

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Accurate and reliable results with the Optrode according to the classical Epton titration

The two-phase Epton titration method is the standard approach for titrating ionic surfactants. It is used whenever the delivery conditions specify this method or when potentiometric surfactant titration cannot be carried out, such as with powdered washing agents.

This Application Note presents the two-phase

titration of ionic surfactants according to Epton. The titration is optimized for the OMNIS Software. Specifically, the concentration of sodium dodecyl sulfate (SDS) in shower gel is determined by titration with hyamine using an Optrode M2.

Two-phase titrations were first developed in the early 1930s and still continue to be improved upon. In 1947, chemist S. R. Epton developed the Epton titration method. In this first iteration, an anionic sample is mixed with methylene blue in diluted sulfuric acid (as an indicator), and chloroform. Vigorous shaking forms an ionic salt that is extracted into the chloroform, turning the phase a blue color. Titrating with the classical cationic surfactant cetylpyridine bromide causes the color to slowly migrate into the upper aqueous phase. The endpoint is reached when both phases turn blue.

In the 1960s, Holness and Stone developed the

method into its current form. They replaced methylene blue with a mixed indicator, dimidium bromide-disulfine blue, and used Hyamine® 1622 as cationic titrant. This new indicator clearly improved endpoint recognition because the color change is only observed in the chloroform phase. The chloroform phase is red in the presence of excess anionic surfactant ions and blue in the presence of excess cationic surfactant ions.

Depending on the titrant (e.g., hyamine or SDS), either anionic or cationic surfactants can be titrated. Despite this, the term «Epton titration» has stuck and is still used today.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on shower gel.

Sample preparation is not required.

EXPERIMENTAL

The determination is carried out on an OMNIS Professional Titrator equipped with OMNIS Dosing Modules (**Figure 1**) as well as an Optrode M2.

An appropriate amount of sample is weighed into the titration beaker, then deionized water, mixed indicator (dimidium bromide-disulfine blue), and chloroform are added. The solution is titrated with standardized hyamine until after the first equivalence point is achieved using a wavelength of 520 nm.



Figure 1. The OMNIS Professional Titrator with OMNIS Dosing Modules (shown here) are ideal for two-phase titrations of ionic surfactants when equipped with the Optrode M2.

RESULTS

The Epton titration method offers very accurate results, as displayed in **Table 1**. An exemplary titration curve of SDS in shower gel with hyamine is given in **Figure 2**, showing the sharp jump in voltage at the equivalence point.

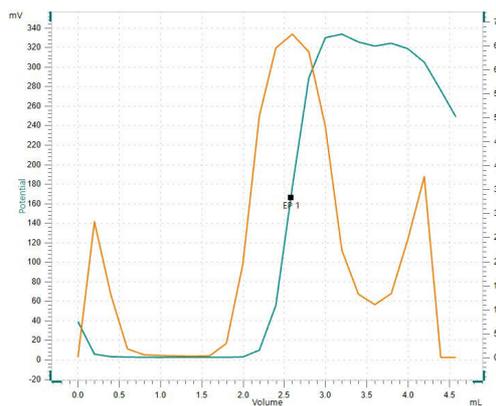


Figure 2. Epton titration curve at 520 nm with one equivalence point.

Table 1. Results of the Epton titration of SDS in shower gel (n = 6).

Sample (n = 6)	SDS (%)	SDS (mmol/100g)
Mean value	5.09	17.65
SD(abs)	0.05	0.19
SD(rel) in %	1.1	1.1

CONCLUSION

Precise and reliable determination of ionic surfactants according to the Epton two-phase titration can be achieved using an OMNIS

system. The Optrode M2, with its glass shaft, is fully resistant against solvents and is therefore ideal for surfactant titrations with chloroform.

CONTACT

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CONFIGURATION



OMNIS Professional Titrator

新型、模式位分析 OMNIS Titrator,于独立行或作 OMNIS 滴定系的核心元件行,用于点和等当点滴定(一/)。由于采用 3S OMNIS Liquid Adapter 技,理化学品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台棒式拌器。包括用于使用其他滴定或加液模平行滴定的“Professional”功能可。

- 通计算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 棒式拌器的接方式
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的 OMNIS Liquid Adapter:安全理化学品,自生厂家的原始数据

量模式和件:

- 点定滴定:“Basic” 功能可
- 点和等当点滴定(一/):“Advanced” 功能可
- 点和等当点滴定(一/),包括 5 路平行滴定:“Professional” 功能可



OMNIS Dosing Module

用于与 OMNIS Titrator 滴定相的加液模,以展外用于滴定/加液的滴定管。可以展磁力拌器和/或螺旋拌器,以作独的滴定台使用。可自由 5、10、20 或 50 mL 量管元。



Optrode M2

有 8 可用波的光度滴定法用光学传感器。可以通件控制 (tiamo 2.5 及以上版本)或通磁来行波切。玻璃鞘溶完全耐受,并且易于清。省空的传感器用于例如:

- 按照 USP 或 EP 的非水溶性滴定
- 基端基的定
- TAN/TBN 根据 ASTM D974
- 硫酸定
- 混凝土中的 Fe、Al、Ca
- 水硬度
- 根据 USP 的硫酸骨素

感器不合通量色度(比色法)来定度。



50 – 150 mL

用于 6014050X0 滴定杯上部的有螺旋塞的 50 – 150 mL 滴定杯。