

Thermo. Titr. Application Note No. H-006

Title: Determination of Non-ionic surfactants

Scope: Determination of a non-ionic surfactant of the alkyl propylene oxide derivative type in commercial mixtures containing anionic surfactants

Principle: When an excess of Ba^{2+} is added to a non-ionic (NIO) surfactant of the alkyl propylene oxide derivative type, a pseudo-cationic complex is formed. This may be titrated with standard sodium tetraphenyl borate (NaTPB) solution. Two tetraphenylborate ions react with the pseudo-cationic complex formed by Ba^{2+} and the NIO

Reagents: **NaTPB Solution.** Weigh 51.3345 g NaTPB into a 500mL volumetric flask, add 1mL 1 mol/L NaOH solution, dissolve and make to volume with DI water. Mix well, and transfer to a brown glass storage bottle (NaTPB is light sensitive). Standardise against A.R. potassium hydrogen phthalate.
BaCl₂ solution, 1 mol/L

Method: Basic Experimental Parameters:

Data rate (per second)	10
Titrant delivery rate (mL/min.)	1
No. of endothermic endpoints	1
Data smoothing factor	50

Procedure:

Weigh accurately approximately 100mL of sample solution into a 500mL beaker equipped with a magnetic spin bar. Add approx. 250 mL deionized water. Mix to disperse and dissolve the sample. Heat to near boiling with stirring, cool and make to volume in a 500mL volumetric flask. Carefully pipette (no bubbles!) 10mL of diluted solution into a titration vessel. Add 15mL D.I. water and titrate to a single exothermic endpoint.

Samples which are easier to dissolve or disperse may be weighed directly. For example, weigh 2g of sample accurately into a titration vessel, add approx. 25mL D.I. water and commence titration after a suitable period of stirring to thoroughly disperse the sample.

Results: Analysis of formulation containing non-ionic and anionic surfactants :
 Mean (n=7) = 8.34 ± 0.02% w/w

Calculation: A 10mL aliquot of diluted solution contained 1.9990g of concentrated sample

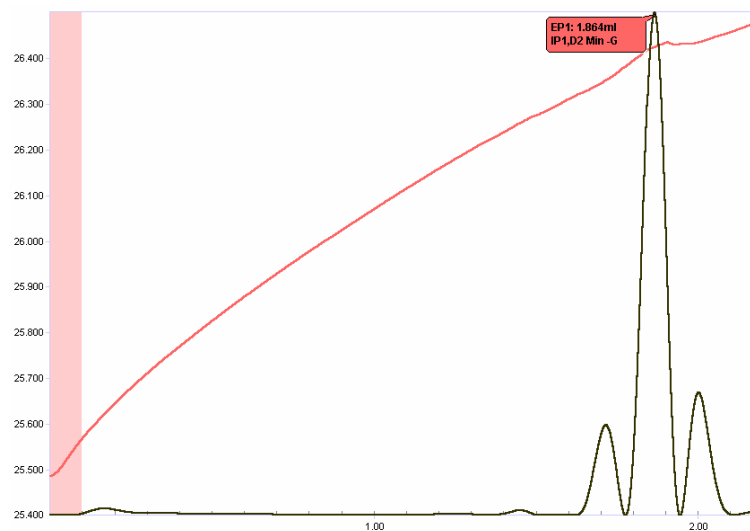
$$\%NIO \text{ w/v} = \frac{((mL \text{ NaTPB} - \text{offset, mL}) \times FW \text{ NIO} \times M \text{ NaTPB} \times 100)}{(1000 \times \text{sample vol., mL} \times 2)}$$

EXAMPLE :

$$\%NIO \text{ w/v} = \frac{((1.865 - 0.014) \times 554.76 \times 0.3247 \times 100)}{(1000 \times 1.9990 \times 2)}$$

= 8.34%

Thermometric Titration Plot:



Legend:

Red = solution temperature curve

Black = second derivative curve