Application Note

Non-ionic Surfactant Analysis by Solid-phase Extraction- High-performance Liquid Chromatography (SPE-HPLC)

Introduction

A non-ionic surfactant contains a hydrophilic group which does not ionize when dissolved in water and has chemical properties making it unaffected by water hardness or electrolytes. A non-ionic surfactant can be used together with virtually any other type of surfactant. The use of non-ionic surfactants has increased dramatically in recent years due to the wide range of properties they offer such as ease of use, high detergency, excellent emulsification/dispersibility and low stimulation.

JASCO HPLC system at *www.jascoinc.com*

Water quality standards established in 2004 specify that the concentration of non-ionic surfactants must be less than 0.02 mg/L.

The established routine analysis method employs Solid-phase Extraction with Absorption Spectrophotometry where the absorbance is measured of complex formed by the reaction of the non-ionic surfactant-Co(II) with a coloring reagent 4-(2-pyridylazo) resorcinol (PAR). In 2012, a new method based on SPE-HPLC was added to the water quality standard for the measurement of non-ionic surfactants. The water quality standard stipulates that measurement of a non-ionic surfactant should be sensitive to at least one-tenth of the acceptable concentration limits and the coefficient of variation required is better than 20%.

In this application note a non-ionic surfactant was analyzed using the newly defined SPE-HPLC method and the results are reported as below.

Keywords

SPE-HPLC, Non-ionic surfactant, Heptaoxyethylene dodecyl ether, 5 µm, C18 column

JASCO INC.
28600 Mary's Court, Easton, MD 21601 USA
Tel: (800) 333-5272, Fax: (410) 822-7526
Application Library: http://www.jascoinc.com/applications

Experimental

Equipment

Pump:	PU-2080
Degasser:	DG-2080-53
Column Oven:	CO-2065
Autosampler:	AS-2057
Detector:	UV-2070

Conditions

Column:	YMC-Triart C18 (4.6 mmI.D. x 150 mmL, 5 µm)
Eluent:	10 mM Sodium tetraborate/Methanol (62/38)
Flow Rate:	1.0 mL/min
Column Temp:	40 °C
Wavelength:	510 nm
Injection Volume:	20 µL
Standard Sample:	Heptaoxyethylene dodecyl ether

Results

Fig. 1 Flowchart of sample preparation.

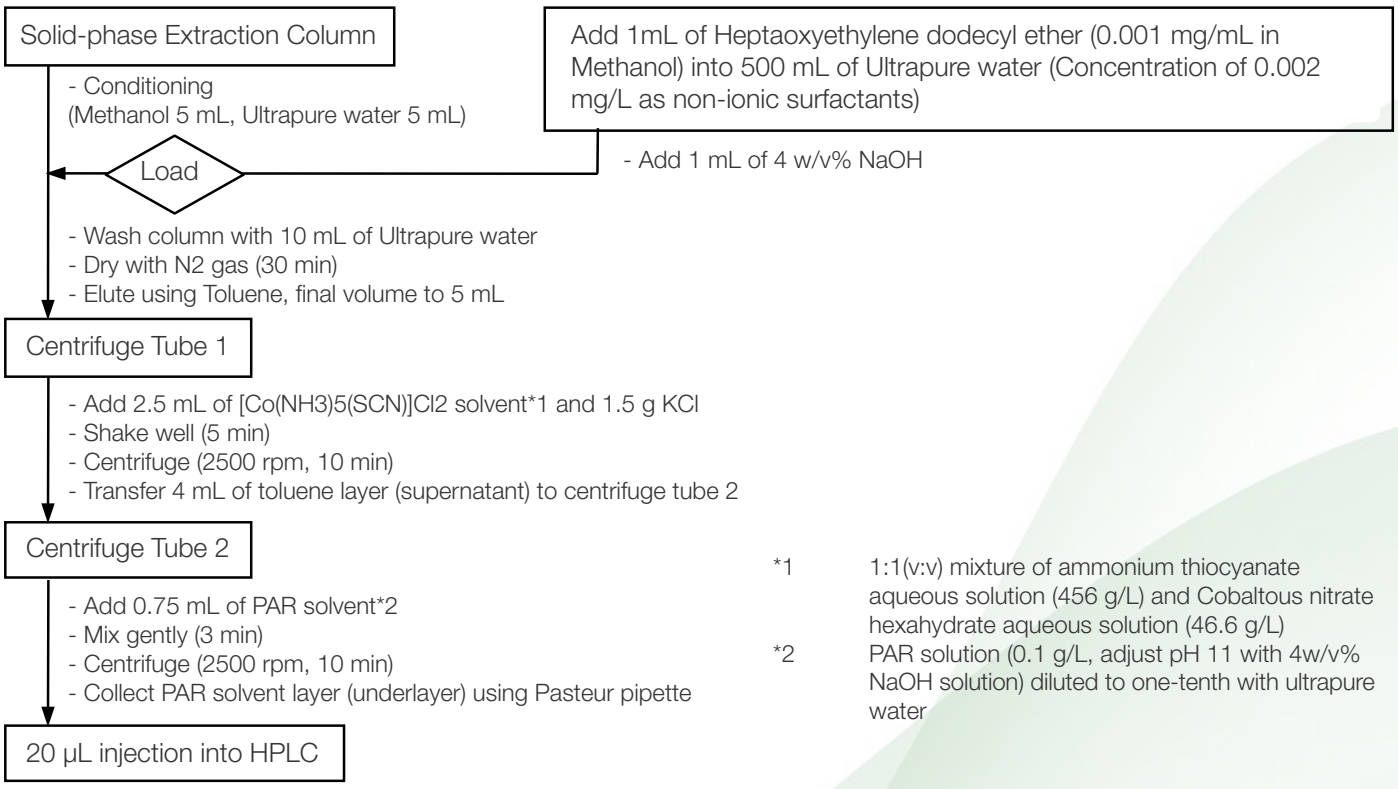


Fig.1. Flowchart for Preparation of Sample Added with Non-ionic Surfactant

JASCO INC.
28600 Mary's Court, Easton, MD 21601 USA
Tel: (800) 333-5272, Fax: (410) 822-7526
Application Library: http://www.jascoinc.com/applications

Fig. 2 shows the chromatogram of sample with added non-ionic surfactant and table 1 shows the peak area. This result satisfies the criteria of measurement quality where the coefficient of variation of measured values is less than 20% when measuring a sample at one-tenth the acceptable concentration defined in the water quality standard.

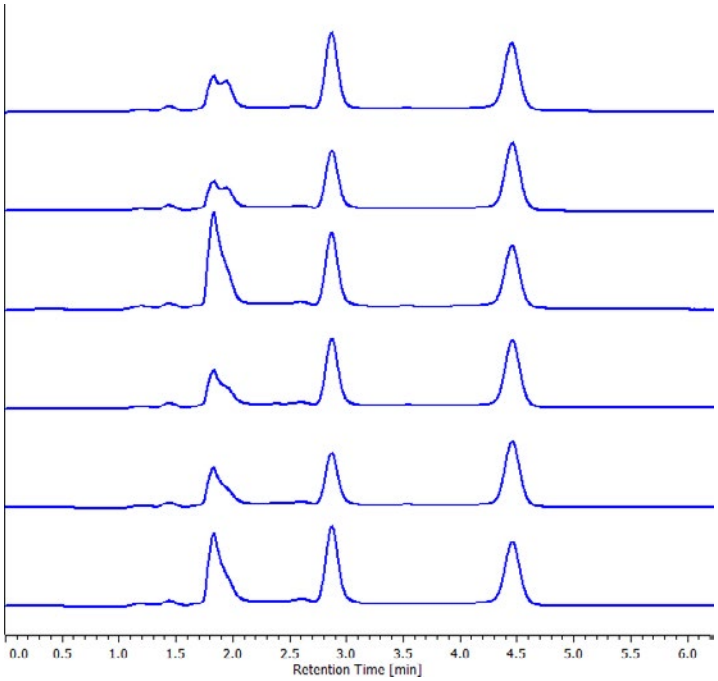
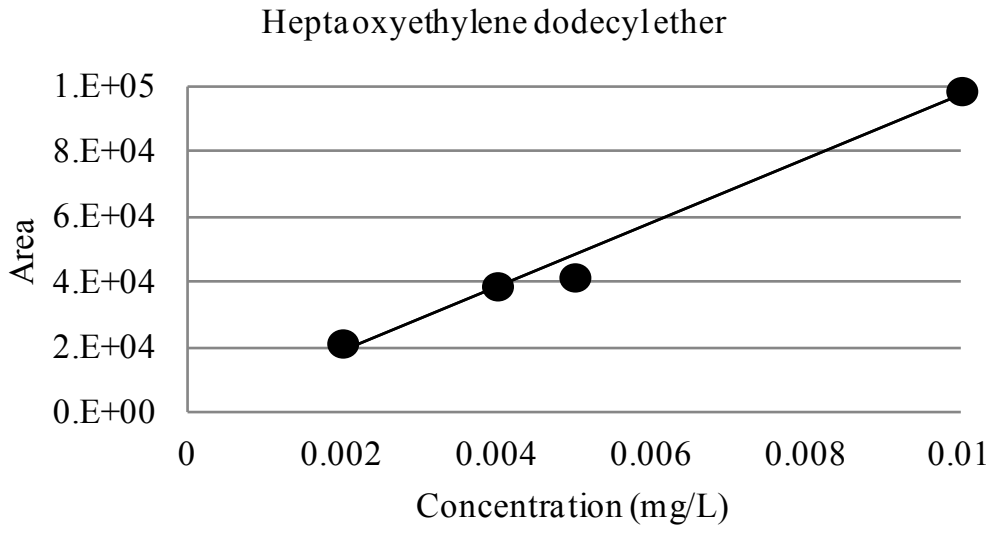


Fig. 2. Chromatogram of Sample Added with Non-ionic Surfactant* (n=6)
1: Heptaoxyethylene dodecyl ether (0.002 mg/L)
*Sample preparation is described on Fig. 1.

Table 1. Result of Sample Added with Non-ionic Surfactant

	Peak Area
1	28974
2	22078
3	28057
4	25492
5	19989
6	29604
AVE	25699
SD	3931.7
C.V.%	15.3

Fig. 3 linearity of sample with added non-ionic surfactant. Four standard samples were measured with concentrations ranging from 0.002 to 0.01 mg/L as specified in the official analytical method, linearity was R2=0.985.



JASCO INC.
28600 Mary's Court, Easton, MD 21601 USA
Tel: (800) 333-5272, Fax: (410) 822-7526
Application Library: http://www.jascoinc.com/applications