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Application Data Sheet

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LC
Liquid Chromatograph

Analysis of Anionic Surfactants Using the RF-20A Fluorescence Detector

In the analysis of anionic surfactants, of which standard values are specified by the water quality standards in the Japanese Water Supply Act, 250 mL of test water is subjected to 250-fold concentration using a solid phase extraction cartridge. The surfactants are then detected with a fluorescence detector after separation utilizing a reversed phase separation column. In this case, a C18 column, which uses the octadecyl silyl group (C18) as the solid phase, was used. Anionic surfactants C10 to C14, which are subject to analysis, include branched chains. Thus, approximately 20 isomers are separated.

Sample Separation of Anionic Surfactants, Classified by Number of Carbon Atoms

In the quantitation of anionic surfactants, mixed standard solutions containing various branched chains of C10 to C14 are used to prepare a calibration curve. The anionic surfactants in the test water are then quantitatively determined after concentration.

LabSolutions workstation software features a grouping function for performing the quantitation calculation. This grouping function classifies the approximately 20 peaks (groupings: C10 to C14 in the figure) obtained from the analysis of the mixed standard solutions by the number of carbon atoms (C10 to C14). It then sums the area values (area summation) and creates a calibration curve.
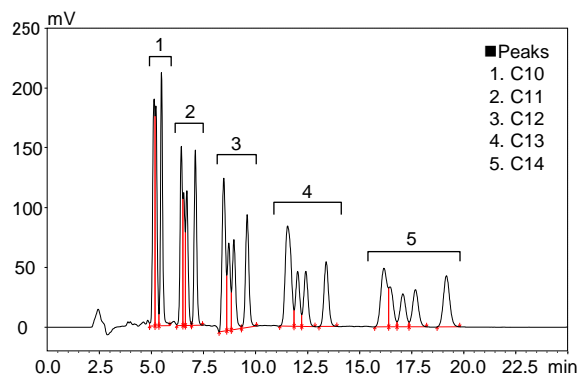

Peaks
1. C10
2. C11
3. C12
4. C13
5. C14

Column:	Shim-pack VP-ODS (250 mmL. × 4.6 mmI.D., 5 μm)
Mobile phase:	A) Water B) Acetonitrile containing 0.1 M Sodium perchlorate B.CONC 65 %
Flow rate:	1.0 mL/min
Column temp.:	40 °C
Injection volume:	20 μL
Detection:	RF-20A, Ex at 221 nm, Em at 284 nm

Fig. 1: Chromatogram for Standard Anionic Surfactant Solutions Obtained with a C18 Column (20 μL injection of 25 mg/L solution comprising 5 mg/L of each substance)

It is possible to use columns with a functional group other than C18 as the solid phase, to divide C10 to C14 branched chains by the carbon number and elute each section as one peak. In this situation, chromatograms of the standard solutions obtained will show a total of five peaks, one each for C10 to C14, so there is no need to use a grouping function.

Related materials present a sample analysis of standard anionic surfactant solutions using LabSolutions as the data processing workstation, the Shimadzu Prominence HPLC / RF-20A fluorescence detector, and a 25-cm long C18 column, as described in the anionic surfactant test method in the Water Supply Act's water quality standards. In addition, these materials offer simple procedures for using the grouping function. In terms of the concentration range for the calibration curves created, in addition to the 5 mg/L to 125 mg/L described in the test method, a range of 1 mg/L to 125 mg/L is presented, thereby expanding the concentration range to a lower concentration region.

Related Materials: Analysis of Anionic Surfactants Utilizing the RF-20A Fluorescence Detector (LAAN-I-LC-E271) Procedures for Group Quantitation (LAAN-I-LC-E272)

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