

## Analysis of Anionic Surfactants by HPLC in Accordance with the Revised Water Quality Testing Method

On the 30<sup>th</sup> May 2003 a revised ministerial ordinance regarding Japanese water quality standards was published (Ministry of Health, Labour and Welfare Ordinance No. 101; effective from 1<sup>st</sup> April 2004), and on 22<sup>nd</sup> July 2003 the testing methods were announced (MHLW Notification No. 261)\*.

In this revision, anionic surfactants were added as an item to be regulated, and their permissible concentration is 0.2mg/L for the total of five components. The adopted

measurement methods are HPLC and flow-path type absorption spectroscopy (the flow-path type absorption spectroscopy can be used until 31<sup>st</sup> March 2007).

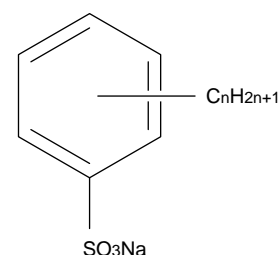
This Application News introduces an example of the analysis of the five anionic surfactant components using the HPLC with fluorescence detection, in accordance with the revised water quality testing method.

\*Partial amendment on March 30,2006 (Japan's Ministry of Health, Labour and Welfare Notification No.191)

### ■ Analysis of Standard Anionic Surfactants

Fig. 1 shows the structure of the five components of anionic surfactant that are the subject of the analysis; sodium decylbenzenesulfonate, sodium undecylbenzenesulfonate, sodium dodecylbenzenesulfonate, sodium tridecylbenzenesulfonate, and sodium tetradecylbenzenesulfonate. Note that each component includes isomers with different alkyl chains.

Fig. 2 shows the result of injecting 20 $\mu$ L of a mixture of the five standard anionic surfactants specified in the new water quality testing method (2.0mg/L of each, total 10.0mg/L). This concentration is 1/5 of the criterion concentration after pretreatment (concentration by a factor of 250) specified in the new water quality testing method.



n = 10: sodium decylbenzenesulfonate  
 n = 11: sodium undecylbenzenesulfonate  
 n = 12: sodium dodecylbenzenesulfonate  
 n = 13: sodium tridecylbenzenesulfonate  
 n = 14: sodium tetradecylbenzenesulfonate

Fig.1 Structure of Anionic Surfactants

Column	: Shim-pack VP-ODS (250mm L. $\times$ 4.6mm I.D.)
Mobile Phase	: Water/Acetonitrile=35/65 containing 0.1M Sodium perchlorate
Flow Rate	: 1.0mL/min
Temperature	: 40°C
Detection	: RF-10AXL Super Ex at 221nm, Em at 284nm
Injection Volume	: 20 $\mu$ L

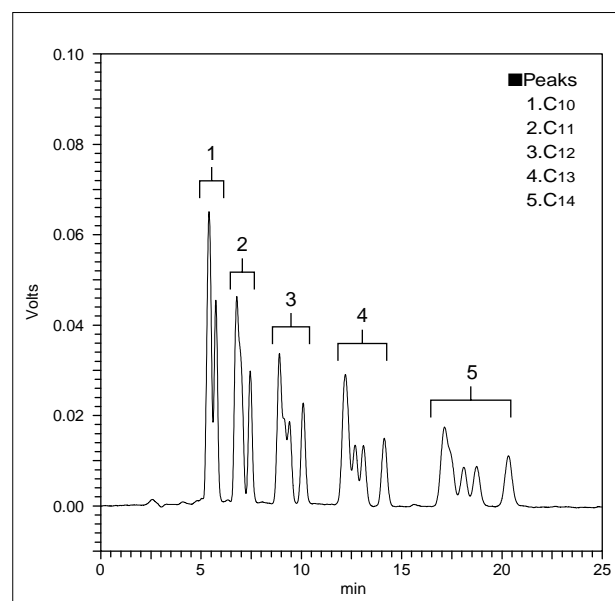


Fig.2 Chromatogram of a Standard Mixture of Five Anionic Surfactants (2.0mg/L each, 10.0mg/L in total, 20 $\mu$ L injected)

### ■ Analysis of Tap Water

Fig.3 shows the pretreatment procedure in accordance with the new water quality test method. Fig.4 shows the result of analyzing tap water in accordance with this pretreatment procedure. The lower chromatogram is for tap water, and the upper for tap water where standard anionic surfactants are

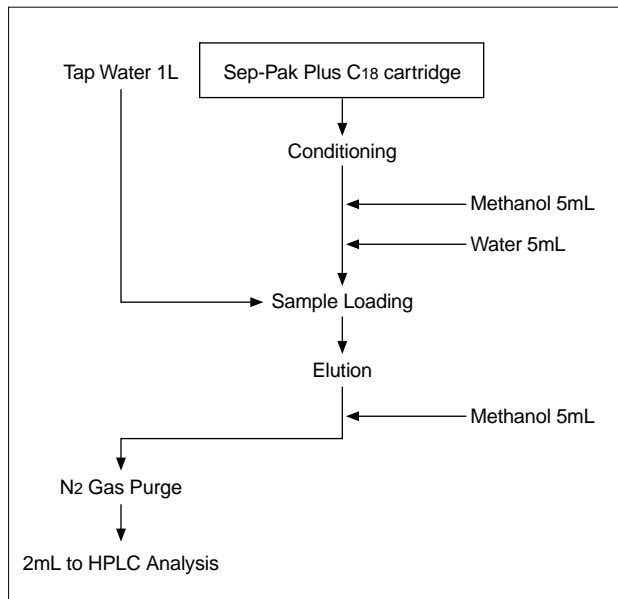


Fig.3 Sample Pretreatment

added at concentrations of 1/10 of the criterion value (0.02mg/L in total).

The injected volume was 20 $\mu$ L for both measurements. The recovery for the tap water with standards were approximately 84 to 106%.

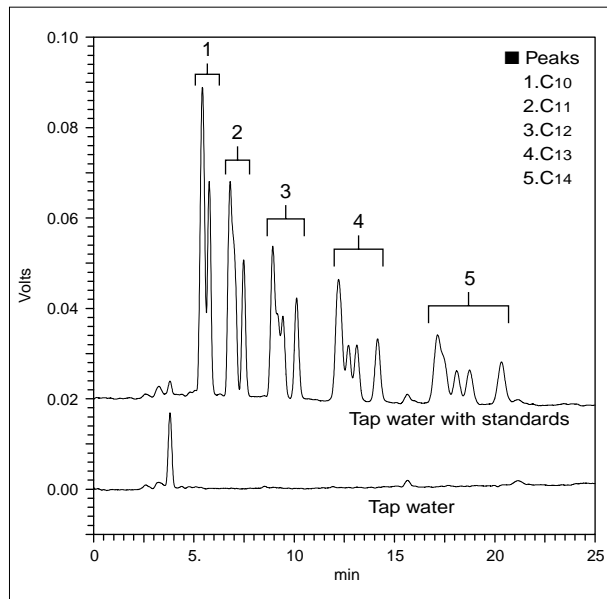


Fig.4 Chromatograms of Tap Water (20 $\mu$ L injected)  
Upper: Tap water with standards at 0.004mg/L each, 0.02mg/L in total  
Lower: Tap water

### ■ Analysis of Domestic Laundry Detergents

Fig.5 and 6 show the results for analyzing domestic detergents dissolved in tap water at a concentration of 500mg/L. The injected volume was 20 $\mu$ L in both

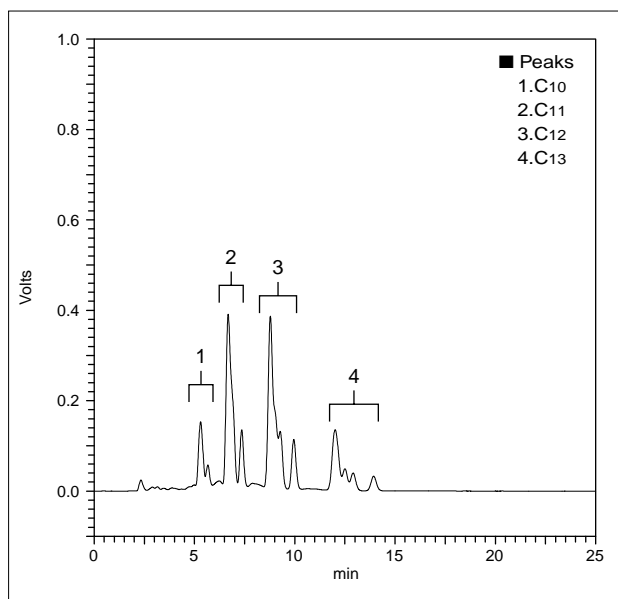


Fig.5 Chromatogram of Laundry Detergent A (500mg/L, 20 $\mu$ L injected)

examples. Peaks were detected at the retention times of anionic surfactants with carbon numbers of 10 to 13.

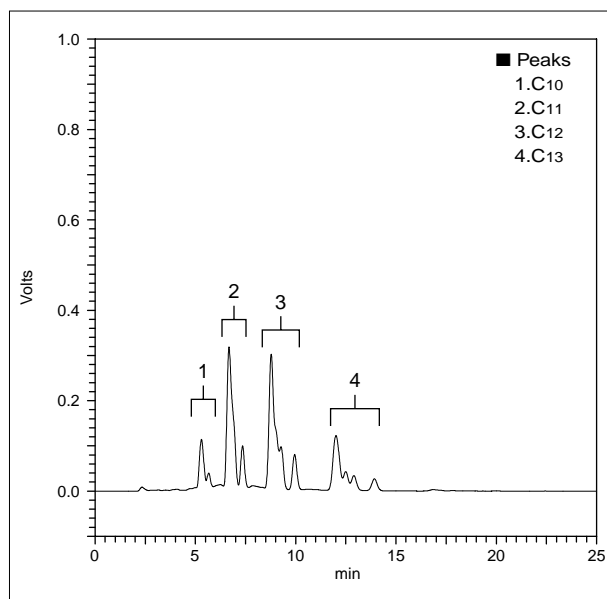


Fig.6 Chromatogram of Laundry Detergent B (500mg/L, 20 $\mu$ L injected)