

OP 01
Phase diagram of ternary mixtures water + <i>n</i>-alkane + non-ionic surfactant
Authors and affiliation
<p>Hiroyuki Matsuda^{*1}, Yuki Nakazato¹, Rei Tsuchiya¹, Yoshihiro Inoue¹, Kiyofumi Kurihara¹, Tomoya Tsuji², Katsumi Tochigi¹, and Kenji Ochi¹</p> <p>¹ Department of Materials and Applied Chemistry, Nihon University, 1-8-14 Kanda Surugadai, Chiyoda-ku, Tokyo 101-8308, Japan</p> <p>² Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Off Jalan Sultan Yahya Petra, Kuala Lumpur 54100 Malaysia</p> <p>*E-mail: matsuda.hiroyuki@nihon-u.ac.jp</p>
Key Word (3 words)
Non-ionic Surfactant, Phase equilibria, Fish-shaped
Abstract (less than 300 words)
<p><i>n</i>-Alkyl polyglycol ethers $\text{CH}_3(\text{CH}_2)_{i-1}(\text{OCH}_2\text{CH}_2)_j\text{OH}$ (C_iE_j) are the most important class of non-ionic surfactants. They are widely used in many different industrial processes such as the surfactant flooding in tertiary oil recovery, production of herbicides, drugs, cosmetics, and nano particles. Understanding the phase behaviors of the ternary mixture water + alkane + C_iE_j is very crucial to choose a suitable surfactant and surfactant concentration for the flooding process [1]. It is also important in the fundamental research of critical phenomena and wetting transitions [2]. Phase diagram of water + <i>n</i>-alkane + C_iE_j has been reported to exhibit complex behavior called “Fish-Shaped” [1, 2], when the temperatures of phase transitions are plotted vs. the mass fraction of C_iE_j in the fixed water / alkane mass ratio. Especially, an intersection of the body and tail of the fish-typed phase diagram is called as “X-point”. One-liquid phase can be formed in the minimum concentration of the surfactant at X-point. Thus, it is important to choose a suitable surfactant and surfactant concentration in the processes using the surfactant.</p> <p>The object of this work is an accurate determination of the phase diagram of ternary mixtures water + <i>n</i>-alkane + C_iE_j using a cloud point method with laser scattering technique [3, 4]. <i>n</i>-Octane and <i>n</i>-dodecane were selected as <i>n</i>-alkane. 2-butoxyethanol (C_4E_1) and 2-(2-hexyloxyethoxy)ethanol (C_6E_2) were selected as non-ionic surfactant. In the measurements of ternary mixtures, the C_iE_j free basis mass fraction of <i>n</i>-alkane “α” was changed from 0.1 to 0.9.</p> <p>In the fish-type phase diagram, body is three-liquid phase, tail is one-liquid phase, and another region is two-liquid phase. An intersection of the body and tail is called “X-point”. Changes in the phase diagram and X-points with different <i>n</i>-alkane, C_iE_j, and the value of α were discussed from the experimental data.</p>
References
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MTMS '21