Program for Advancing Strategic International Networks to Accelerate the Circulation of Talented Researchers
Japan-ASEAN Collaboration Research Program on Innovative Humanosphere in Southeast Asia:
In search of Wisdom toward Compatibility Growth and Community in the World

Report

Period of inviting: 08th November – 23rd December, 2016
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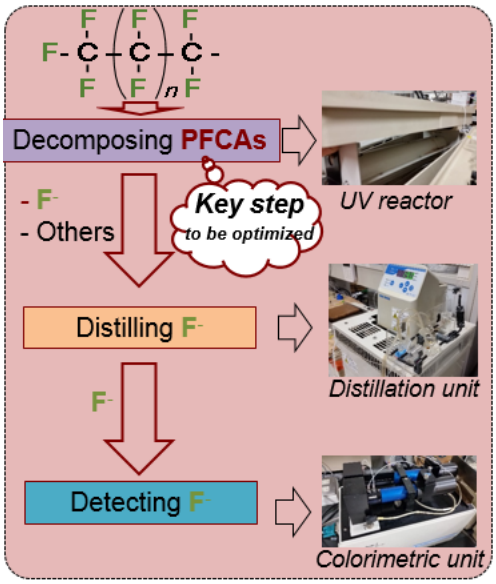
**<u>Research title:</u> Optimization of Analytical Conditions for Perfluorinated Carboxylic Acids (PFCAs) by a Simple Continuous Flow Analysis**




PFCAs are compounds of the formula $C_nF_{2n+1}CO_2H$ which are classified as member of Perfluorinated compounds (PFCs) family; very stable, man-made, fully fluorinated and widely used in industrial and commercial applications since the 1960s (*Lutz Ahrens 2011*) because of their unique lipid- and water- repellent characteristics. They were also reported to be persistent because of not being eliminated by conventional water and wastewater treatments (*US.EPA 2014; Fujii S. 2007; Tanak S. 2008; Kunacheva C. 2012*). HPLC-MS/MS, LC-MS/MS, GC-MS can be used to analyze PFCAs with some pre-treatment procedures, however, they re complicated and high cost (*US.EPA 2014)*.

Therefore, development of a more practical analytical protocol being simple, cheap and rapid for PFCAs determination is considered. This analytical protocol consists of three main steps (see figure): decomposition of PFCAs to $F^-$, distillation of the $F^-$, and colorimetric detection of the $F^-$. The first step is the most important with an expected decomposition efficiency of 100%. A continuous-flow UV reactor was introduced to carry out the decomposition process of PFCAs under a heated $K_2S_2O_8/H_2SO_4$/UV oxidation. Ideally by using this approach, burden sample pre-treatment procedures are reduced, all PFCAs present in sample are detected through the value of total organic fluorine (TOF), and considerably high accuracy is able to be obtained by optimizing the decomposition efficiency from PFCAs to $F^-$. Initial research works obtained the highest decomposition efficiency of 70 – 90% for 6 PFCAs (*Nguyen Duy Hung 2014*). During the above-mentioned period of inviting, another important influencing factor – UV retention time – was investigated to improve the decomposition effciency.

Other useful activities were also involved, for an example, the International Workshop "***The Japan – ASEAN Collaborative Research Program on Innovative Humanosphere in Southeast Asia: In Search of Wisdom toward Compatibility Growth and Community in the World***" (KU, 16/12/2016).