

Detection of nonmetallic elements by gas chromatograph using helium microplasma emission detector

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Gas chromatograph (GC) has been widely used because of its usability and low running cost. In particular, it shows great capability of food inspection because of high sensitivity for detecting organophosphorous and organochlorine pesticide. Electron capture detector (ECD) can detect halogen compound, and Flame photometric detector (FPD) has good sensitivity for phosphorus and sulfur compounds. However, two GCs equipped ECD and FPD are required for simultaneous detection of low-concentrated samples. In our group, to realize high-sensitive detection of nonmetallic elements at one time using one detector, plasma emission detector using helium microplasma have been developed. Helium has the highest ionization (24.58 eV) and metastable (19.82, 20.62 eV) potential in all elements. So, helium plasma can effectively ionize or excite all other elements. In this study, LF powered micro hollow cathode discharge (LF-MHCD) was developed and applied to emission source for optical emission spectrometry. The LF-MHCD can generate stable and robust plasma in atmospheric pressure. Emission from plasma gas and analytes are measured using multi-channel spectrometer (Ocean Optics, HR4000). When 1 mL of 30 ppm fluorocarbons (CH_2Cl_2 , $\text{CH}_3\text{CH}_2\text{I}$, CH_2Br_2) were introduced and analyzed using the new detector, Strong emission of chlorine, iodine and bromine (912.11, 905.83, 889.76 nm) were observed and LODs were 80, 180 and 110 ppb, respectively. Detection of other nonmetallic elements such as sulfur or phosphorus will also be presented.

Biography

Yuta Suzuki graduated from the Department of Electrical and Electronic Engineering, Tokyo Institute of Technology in 2011. He is a student of master's degree in the Department of Energy Sciences, Tokyo Institute of Technology and have studied the industrial applications of atmospheric pressure plasma. He actively participated in Society including International Congress on Analytical Sciences 2011 (ICAS2011).

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