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# Quantitative determination of total cesium in highly active liquid waste by using liquid electrode plasma optical emission spectrometry

Van-Khoai Do[a]*, Masahiko Yamamoto[a], Shigeo Taguchi[a], Yuzuru Takamura[b], Naoki Surugaya[a], Takehiko Kuno[a]

[a] Tokai Reprocessing Technology Development Center, Nuclear Fuel Cycle Engineering Laboratories, Japan Atomic Energy Agency (JAEA). 4-33 Muramatsu, Tokaimura, Naka, Ibaraki, Japan.

[b] School of Materials Science, Japan Advanced Institute of Science and Technology (JAIST), Nomi, Ishikawa 923-1211, Japan.

*Corresponding author. Tel: +81292821133. dovan.khoai@jaea.go.jp



## Abstract

A sensitive analytical method for determination of total cesium (Cs) in highly active liquid waste (HALW) by using modified liquid electrode plasma optical emission spectrometry (LEP-OES) is developed in this study. The instrument is modified to measure radioactive samples in a glove box. The effects of important factors, including pulsed voltage sequence and nitric acid concentration, on the emission of Cs are investigated. The limit of detection (LOD) and limit of quantification (LOQ) are 0.005 mg/L and 0.02 mg/L, respectively. The achieved LOD is one order lower than that of recently developed spectroscopic methods using liquid discharge plasma. The developed method is validated by subjecting a simulated HALW sample to inductively coupled plasma mass spectrometry (ICP-MS). The recoveries obtained from a spike-and-recovery test are 96–102%, implying good accuracy. The method is successfully applied to the quantification of Cs in a real HALW sample at the Tokai reprocessing plant in Japan. Apart from dilution and filtration of the HALW sample, no other pre-treatment process is required. The results agree well with the values obtained using gamma spectrometry. The developed method offers a reliable technique for rapid analysis of total Cs in HALW samples.