

Method Validation for a radiochemical separation of volatile ^3H and ^{14}C in spent filters

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The inventory of ^3H and ^{14}C in intermediate- and low-level radioactive waste (ILLW) is mandatory for permanent disposal to ILLW repository. Because both are pure beta particle emitting radionuclide, they can be readily interfered by the co-existing radionuclides. So separation process are necessary for detection by beta counting like liquid scintillation counter (LSC). Recently, Korea government's Nuclear Safety and Security Commission (NSSC) declared the legislative notices about strengthened quality assurance in analysis of radioactive wastes. Therefore, test method in use has been re-evaluated to meet the requirement in accordance with method validation, which is proceeded by test equipment confirmation and radioactivity measurement of simulated sample. In the test equipment confirmation, equipment in use currently are suitable for simultaneous analysis of both volatile radionuclides. It was confirmed by in comparison with added radioactivity and recovered radioactivity. Both gave a result of more than 90% recovery in test equipment confirmation. Next, radioactivity measurement of simulant containing both reference radioactive materials was done. This step was also confirmed in comparison with added radioactivity and recovered radioactivity of two different types of simulant: papers and filters. The results of two types of simulant showed more than 95% recovery of ^3H and more than 90% recovery of ^{14}C , respectively. These results meant that test method in use was suitable for simultaneous analysis of ^3H and ^{14}C and independent on the types of simulant. Finally, validated test method was applied to the analysis of 10 different spent filters from operational radioactive waste. It was confirmed that both specific radioactivity were below the level of low-level radioactive waste.

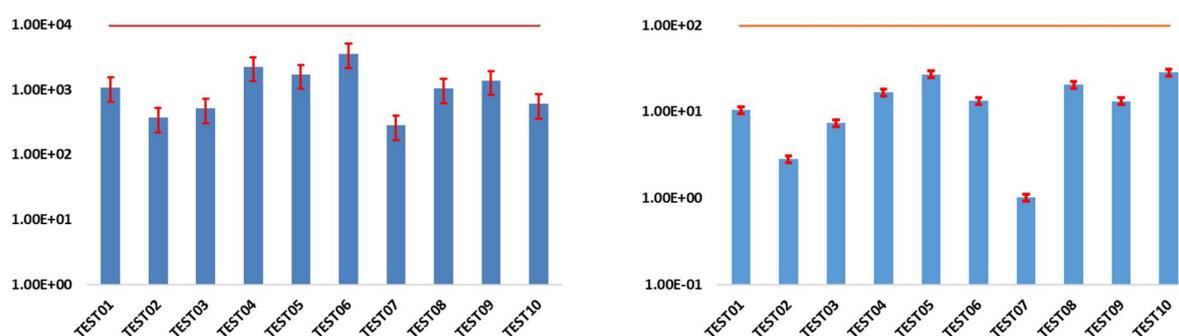


Fig. 3. Specific radioactivity of ^3H (left) and ^{14}C (right) in 10 spent filters from operational wastes: rectangular bar for specific radioactivity, scale bar for uncertainty and linear for lower limit for low-level radioactive waste.

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