Development of a technique for direct measurement of high level tritium activity on solid surfaces

Abstract

Tritium is a radioactive isotope and it disintegrates through beta particle decay. The average energy of beta particle is 5.7 keV. Tritium is used as a fuel in nuclear fusion process. It is also utilized in 14 MeV neutron generators. Tritium is distributed widely in its concentration and chemical form in nuclear fusion application, no single T-measuring method can cover the wide concentration ranging from environment level (a few Bq) to carrier free level (GBq or above) and distinguish various tritiated compounds (gas, water, and organics). In principle, any methods used for hydrogen measurements can be used for T measurements. However, safety requirements owing to the radioactivity of T give limitation in the measurements. Furthermore, electric noises caused by b-electrons emitted at T decay often disturb the measurements. On the other hand, they are allowed to use the radioactivity measurement but their energy is so low to make their detection difficult.

There are lot of methods already established for the gas and liquid form of tritium measurement but measurement on solid surfaces is still have limitations. Most of the measurements are established for low level activity measurement. Swipe Assay also carries large error in measurement. In order to measure high level with less uncertainly, requires a different approach. In this project work, the measurement techniques for high level tritium activity measurement on the solid surfaces need to be established. It involves the nuclear and electrical expertise to design and develop the technique. The technique will support in precise measurement of tritium target activity used in 14 MeV neutron generator.

Academic Project Requirements:

1) **Required No. of student(s) for academic project: 01**

2) **Name of course with branch/discipline: M. Tech (Nuclear Engineering)**

3) **Academic Project duration:**

   (a) Total academic project duration: 9-12 Months

   (b) Student's presence at IPR for academic project work: 3 or 4 Full working Days per week (or as per IPR office guideline for project students)

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