A tritium accounting model for in-bed calorimetry of a hydrogen isotope storage and delivery system

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Tritium is a radioactive hydrogen isotope, which can be burned with deuterium as a nuclear fusion fuel. Accurate accountancy of tritium content in a storage vessel of nuclear fusion reactor is important for fuel management. Accordingly, accounting tritium is a significant research issue. Accounting methodology applying an in-bed calorimetry has been researched in nuclear fusion engineering field. In addition, a calorimetry using helium gas circulation is already well established. In this study, we proposed a mathematical model using cooling temperature of a heated tritium storage vessel. The proposed tritium accounting model was scrutinized with temperature data of a tritium storage vessel in cooling. In this paper, the proposed model is applied to measuring of tritium contents in the storage vessel in order to validate the availability of the accounting methodology. The model showed good agreement with expected tritium contents.