Report of the NIM Radioactivity Group to CCRI（II）

ZHANG Jian
Leader of Division of Ionizing Radiation, National Institute of Metrology
Address: No.18,Bei San Huan Dong Lu,Chaoyang Dist, Beijing, P.R.China

1. Introduction

Division of Ionizing Radiation is an sub-insititute under National Institute of Metrology(NIM) and consists of three labs: lab of radiation dosimetry, lab of radioactivity , and lab of accelerator. It is responsible for establishment of national standards in the fields of radioactivity, dosimetry and neutron measurements, maintenance of international equivalency through the participation of BIPM and APMP key comparisons, dissemination of national standards by calibration service and radioactive reference materials and development of advanced measurement technology to improve the measurement accuracy. It dedicates to fulfill the mission to satisfy the needs for measurement and standard in medicine, energy, environment and security related fields.

The Radioactivity Lab has established five primary standard systems and six secondary standard systems, including 4πβ(PC)-γ coincidence, 4πe,x(PPC)-γ coincidence and 4πγ ionizing chamber secondary standard, etc. These standards are built to satisfy the nation’s needs for measurement and standard in medicine, energy, environment and security domains. We are updating radon and radon progenies standard to cover the radon progenies instruments calibration needs.

2. Staff and contact

The team currently comprises:

Prof. ZHANG Jian

Ph:+0086 64525001 Email:jzh@nim.ac.cn

Prof. YANG Yuandi

Ph:+0086 64525013 Email: yangyd@nim.ac.cn

Ms. CHEN Jing

Ph:+0086 64525019 Email: chenj@nim.ac.cn

Mr. LIANG Juncheng

Ph:+0086 64525010 Email: liangjc@nim.ac.cn

Ms. ZHAO Qing

Ph:+0086 64525018 Email: zhaoqing@nim.ac.cn

Mr. LIU Haoran

Ph:+0086 64525010 Email: liuhr@nim.ac.cn

Mr. ZHANG Ming

Ph:+0086 64525010 Email: zhming@nim.ac.cn

3. Main equipments and capabilities of the activity laboratory

- 4πβ(PC)-γ, 4πe,x(PPC)-γ and 4πβ(LS)-γ coincidence counting system used to maintain the Chinese Primary standard of activity.
- TDCR liquid scintillation counting system for determining the activity of pure beta and electron emitters.
- 4πγ Pressurized ionizing chamber as a secondary standard for determining the activities for γ and high energy β emitters.
- High purity Germanium spectrometer for determination of activity of

nuclides with γ emission.

4. Activities

- Developed the Digital Coincidence Counting technique for beta-gamma counting primary standard.
- Standardized $^{99}Tc^{m}$ nuclide by 4πe,x(PPC)-γ coincidence method, and participated in the BIPM.RI(II)-K4.Tc-99m comparison in 2012.
- Constructed and implemented a TDCR liquid scintillation system and completed the activity measurement of ^{3}H.
- Standardization of ^{22}Na by means of CIEMAT/NIST method.

5. Publications

1) Influence of Tracer Nuclide Activity Variation in Its Uncertainty Range on CIEMAT/NIST Method Results. Atomic Energy Science and Technology, Vol.46(11), 2012.
2) Influence of the Source Position to the Well-type NaI(Tl) Detection Efficiency Based on a Monte Carlo Simulation. Nuclear Electronics and Detection Technology, Vol.32(1), 2012.
3) A Study and Preliminary Results of the 4πγ Well-type NaI(Tl) Crystal Detector. Acta Metrologica Sinica, Accepted.
4) Standardization of Tritium Water by TDCR Method. Plasma Science and Technology, Vol.14(7), 2012.

5) Construction and Implementation of a Liquid Scintillation TDCR System. Progress Report on China Nuclear Science and Technology, Vol.2, 2011.

6) Digital Coincidence System for Beta-gamma Coincidence Counting. Nuclear Physics A, 834, 2010.