Recent Activities in Activity Measurement at the Czech Metrology Institute

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The work during 20012-13 was focused on these areas:

1. **Routine activities**
2. **Special metrological service**
3. **International comparisons**
4. **Radon in water standard**
5. **LSC - TDCR**
6. **Spectrometry and decay data evaluation**
7. **Coincidence system**

1. Routine activities

More than 25 radionuclides (^{22}Na, ^{24}Na, ^{45}Ca ^{51}Cr, ^{54}Mn, ^{56}Mn, ^{55}Fe, ^{57}Co, ^{58}Co,^{60}Co, ^{65}Zn, ^{88}Y, ^{85}Sr, ^{89}Sr, ^{90}Sr, ^{99}Tc, ^{109}Cd, ^{113}Sn, ^{125}I, ^{131}I, ^{133}Ba, ^{134}Cs, ^{137}Cs, ^{139}Ce, ^{147}Pm, ^{152}Eu, ^{192}Ir, ^{203}Hg, ^{204}Tl, ^{210}Pb, ^{241}Am) have been measured for the production of standards.

2. Special metrological service

Secondary standardization method of Kr- and Xe-133 was improved

Content of an element plutonium in several neutron Pu-Be sources was determined by spectrometric method

3. International comparisons

Participation in the project LASCE (Large Area Source Exercise)

Participation in the EURAMET project č.1243 “The interlaboratory comparison of the radionuclide calibrators”

Participation in ICRM exercise “Coincidence summing comparison for volume sources” (Gamma Spectrometry Working Group)

The participation in the ongoing comparison of activity measurements of Kr-85.

4. Radon-in-water standard

Activity of ^{226}Ra in radium daughter products free solution was determined by 4πα liquid scintillation method. The sources were prepared from solution with known ^{226}Ra mass concentration, from which, immediately before LS counting, ^{222}Rn and its daughter nuclides were removed by solvent extraction. The results were presented at ICRM-LLRMT2012 conference.

5. LSC – TDCR

The software has been revised and extended to enable more precise beta spectra calculating. The influence of different beta spectra shapes for some nuclides (e.g. ^{99}Tc, ^{89}Sr, ^{147}Pm, ^{241}Pu) was studied and the results were presented at LSC2013 conference in Barcelona.

6. Spectrometry and decay data evaluation

Coincidence probabilities of true summation effect have been calculated for Ir-192

The laboratory was equipped by Si(Li) detector for X-ray and β spectrometry. It will be used for the determination of impurities in solutions used for the production of standards.

The new model of Si(Li) detector for detection efficiency calculation was developed and validated.

7. Coincidence system

A new pressurized proportional counter designed for coincidence method was put into operation and tested. It will be used for measurement of EC nuclides.

The method of activity measurement of nuclide ^{137}Cs was revised. The possibility of using TDCR and efficiency tracing method was studied. The results will be presented at ICRM 2013 conference.