

Protocol for a EURAMET Key Comparison of ^{166m}Ho

1. Introduction

This work is done in relation to EMRP project Radioactive Waste Management (METRO-RWM) in Task 5.1.

2. Comparison protocol

Pilot laboratory: Physikalisch-Technische Bundesanstalt (PTB), Germany

Participants:

CIEMAT (Spain)
CMI (Czech Republic)
IRMM (EC)
CEA-LNHB (France)
PTB (Germany)

Chemical composition of the Solution:	Ho in a 1 M HCl solution
Approximate activity concentration:	125 kBq/g
Container:	PTB-type ampoule
Mass:	0.58 grams
Recommended nuclear data:	Decay Data Evaluation project http://www.nucleide.org/DDEP_WG/Nuclides/Ho-166m_tables.pdf But half-life: $T_{1/2} = (1132.6 \pm 3.9) \text{ y } (k=1)$

2.1 Schedule

Distribution: It has been agreed that the solution will be distributed to the participant in February 2013.

The following schedule for reporting is proposed:

Reporting dead line:	31 st May 2013 (but not before PTB has sent its result to SIR !)
Draft A sent to participants:	31 st July 2013
Draft A acceptance dead line:	30 th September 2013
Draft B sent to participants:	15 th October 2013
Draft B acceptance dead line:	30 th November 2013

2.1 Further information

The measurand for this exercise is activity per mass.

The costs associated with the shipping of the ^{166m}Ho comparison solution from PTB to the participants will be borne by the PTB.

All results, method of standardisation, associated uncertainties, and any additional requested information shall be transmitted to the PTB using the reporting forms provided. The PTB shall send a copy of its own results to the Executive Secretary of the CCRI(II) prior to receipt of any results from participants.

PTB will also participate in the BIPM.RI(II)-K1.Ho-166m comparison by sending first an ampoule to the BIPM. To preserve the confidentiality, its equivalence will be kept undisclosed by the BIPM until the results of the new EURAMET comparison are published.

The PTB will pilot the new comparison, collect all the results and distribute the Draft A-1, except for the linking. The BIPM will disclose the PTB results for the BIPM.RI(II)-K1.Ho-166m comparison and the PTB will complete and distribute the Draft A including the establishment of the link according to the usual process.

Participants must provide a list and evaluation of the principal components of the uncertainty budget based on the Guide to the Expression of Uncertainty in Measurement, published by ISO. In addition to the principal components of the uncertainty, common to all of the participants, individual institutes must add any other components they consider appropriate. Uncertainties are evaluated at a level of one standard uncertainty ($k=1$).

3. Preparation of the report on the comparison

The PTB is responsible for the preparation of the report on the comparison. The report passes through a number of stages before publication and these are referred to as Draft A and Draft B.

During the comparison, as the results are received by the PTB, they are kept confidential by the PTB until all participants have completed their measurements and all the results have been received, or until the dead line for receipt of results has passed.

A result from a participant is not considered complete without an associated uncertainty and is not included in the draft report unless it is accompanied by an uncertainty supported by a complete uncertainty budget. Uncertainties are drawn up following the guidance given in the Technical Protocol.

If, on examination of the complete set of results, PTB finds results that appear to be anomalous, the corresponding institutes are invited to check their result for numerical errors but without being informed as to the magnitude or sign of the apparent anomaly. If no numerical error is found, the result stands and the complete set of results is sent to all participants.

The draft A report is prepared as soon as all the results have been received from the participants. It includes the results, uncertainties and standardisation methods and experimental details transmitted by the participants, identified by name. The draft-A report is sent to the participants as soon as possible after the completion of the comparison to all the participants for comments, with a reasonable deadline for replies. The date at which this draft is sent to the participants is taken to be the end date for the comparison and is subsequently referred to as such.

If any controversial or contradictory comments are received by the PTB, they will be circulated to all participants and discussion continues until a consensus is reached.

Draft A is considered as confidential to the participants. Copies are not given to non-participants, and graphs or other parts of the draft are not used in oral presentations at an external conference without the specific agreement of all the participants. The results may be the subject of an internal report if they are shown in relative terms and the names of participants hidden. At this stage, a participant may publish experimental techniques of special interest or new developments of a measurement method made in the frame of the comparison, as long as no information or comments are made about the comparison results.

Note that once all participants have been informed of the results, individual results and uncertainties may be changed or removed, or the complete comparison abandoned, only with the agreement of all participants and on the basis of a clear failure of the travelling standard or some other phenomenon that renders the comparison or part of it invalid.

Karsten Kossert
PTB