



Contribution ID: 44

Type: not specified

Future chemistry experiments

Wednesday, 17 July 2019 10:05 (20 minutes)

On the progress in automation of the chemical experiments with Mn-57 at ISOLDE CERN

Yu.K.Belov, S.K.Dedushenko, D.M.Levin, M.G.Tsepkov
Moscow, Russia
Mössbauer Collaboration Team
ISOLDE, CERN

First wet-chemical experiments with Mn-57 were conducted at ISOLDE in June 2017. They comprised multiple steps: placement of a piece of metallic foil (target) in the implantation chamber followed by its evacuation, accumulation of Mn-57 by ion-implantation into the foil, vacuum release and removal of the foil from the chamber, packaging and transportation of the foil to the chemical lab, unpackage the foil, dissolution of manganese layer from the foil by acid followed by the additions of chemicals to transform manganese into the desired chemical form, preparation of a sample for Mössbauer measurement including freezing of a solution, measurement, radioactivity waste and preparations for the next repetition.

To constrict the time lost, to improve the radiation safety, and to increase the efficiency of the experiments, we consider the automation of all steps of the experimental procedure.

The fast insertion/removal of the target into/from the implantation space without vacuum release can be performed by a valve mechanism [1].

To obtain maximum specific count rate with Mn-57 the valve should be turned approx. every minute, which seems acceptable time for the chemical treatment (e.g. permanganate synthesis) and accompanying manipulations (from unloading target from the valve to the sample preparation for the Mössbauer measurements).

The valve has been developed, manufactured, and tested for operation under vacuum. Its body is made of aluminium alloy, the rubbing surfaces being covered by alumina by MAO-technology (see e.g. [2]). Apiezon-L grease [3] is used for fine and hermetic turn.

[1] www.happysloth.ru/ISOLDE

[2] V.N.Malyshev, K.M.Zorin // Applied Surface Science 254(2007)1511-1516.

[3] www.apiezon.com/products/vacuum-greases

Presenter: DEDUSHENKO, Sergey K (Moscow Institute of Physics and Technology State University (RU))

Session Classification: Future shifts/proposals