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NKS Workshop on Radioanalytical Chemistry — Final report

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Abstract

The NKS-B workshop on radioanalytical chemistry was held 2-6th Sept 2013 at Risø, Denmark. There were a total of 49 persons participating in the workshop, including 32 young participants and 15 lecturers. The workshop started with 3 days of lab practice followed by 1.5 day's lectures by the experienced experts from different research fields, and then a half day's presentation by the young participants. A questionnaire investigation completed after the workshop highlighted the necessity and importance of organization of such workshop in each 3-4 years for community of both Nordic and other European countries.

Key words

Workshop; Radiochemistry, Radioanalysis, Analytical Chemistry, Radionuclide

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—— Final report

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Project partners and workshop organizer:

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Sven P. Nielsen, Technical University of Denmark
Jukka Lehto, University of Helsinki, Finland
Mats Jonsson, Royal Institute of Technology, Sweden
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Mats Eriksson, Swedish Radiation Safety Authority, Sweden

The NKS-B workshop on radioanalytical chemistry was hold in 2-6th Sept 2013 at Risø, Denmark. This is the 2nd Nordic Workshop on Radioanalytical Chemistry following the 1st one hold in Nov. 2009 in Roskilde, Denmark. The workshop was organised by the Technical University of Denmark, in collaboration with University of Helsinki; Norwegian University of Life Sciences, Royal Institute of Technology, and Swedish Radiation Safety Authority; and supported by Nordic Nuclear Safety Research NKS-B programme.

There were total 49 persons participating in the workshop, including 32 young participants, 15 lecturers and 2 secretaries. About half of the young participants are PhD or master students. Among the 32 young participants, 17 are from Sweden, 5 from Denmark, 3 from Norway, 3 from Finland, 4 from Germany, UK, Korea and China. Based on the feedback from last workshop in 2009, this workshop started from 3 days lab practice followed by 1.5 days lectures by the experienced experts from different research fields and then half days presentation by the young participants.

The three laboratory practices were organized in three parallell groups and carried out in the laboratories of the Center for Nuclear Technologies, Technical University of Denmark. Each lab practice took 1.5 days and then repeat once, enable each participant to participate in 2 lab practices during the workshop. The three lab practices are: (1) Radiochemical separation of Pu and ICP-MS measurement of Pu isotopes instructed by Dr. Jixin Qiao; (2) Radiochemical separation of ^{210}Po and ^{226}Ra and their alpha spectrometry measurement instructed by Dr. Per Roos; (3) Radiochemical separation of ^{55}Fe, ^{63}Ni, ^{90}Sr and their LSC measurement instructed by prof. Xiaolin Hou. The workshop was formally opened at 8:30 am, 5th Sept. firstly the director of the Center for Nuclear Technologies, Technical University (DTU Nutech), Dr. Jens-Peter Lynlov, gave a warm welcome address, and introduced the work in DTU Nutech, followed a welcome address by the head of Programm of Radioecology and tracer (RAS), DTU Nutech, Dr. Sven P. Nielsen, he present the work on environmental radioactivity carried out in Denmark. Afterward, The NKS-B manager, Dr. Kasper G. Andersson presented the information of NKS. The lecturs/presentations were organized in 8 sessions: i.e. general aspects in radioanalytical chemistry; Radioanalytical method; Mass spectrometry methods; Radiometric methods; Speciation analysis of radionuclides; Automatic methods; oral presentations by young participants; and poster session. In total 16 lectures covering all aspects in the radioanalytical chemistry were presented by 8 invited experts and experts from organizer's insitutions for 35 min each with discussion. 8 oral presentations of 15 minutes each and 6 posters were presented

by young participants. After the lectures/presentation, an open discussion was organized among all participants to discuss the related issues.

An abstract book of all presentations of 50 pages was printed and distributed to all participants during the workshop, an electronic version of the abstract book was published as a NKS report (NKS-290) (http://www.nks.org/en/nks_reports/view_document.htm?id=111010111771656), on 6th Sept. 2013. The slides of the 23 lectures and oral presentations were published as PDF files in NKS website immediately after the workshop, these slides are accessible from NKS website: (http://www.nks.org/en/seminars/presentations).

Objectives of the workshop and performance

The objectives of this workshop include:

1) To provide the participants with an overview of radiochemical analytical methods for determination of various radionuclides (mainly beta and alpha emitting) relevant to environmental radioactivity and waste management
2) To provide an opportunity to the participants getting knowledge and practical (hands-on) experience of state-of-the-art measurement techniques used for the determination of different radionuclides by participating in practical training in the laboratory (experimental demonstration and analysis of real samples)
3) To provide a forum for knowledge exchange of analysis of various radionuclides and discussion of present radiochemical procedures for individual radionuclides.

Which all lead to education of MSc and PhD student, and increased competence of staff involved in radiochemical separation and determination of radionuclides. These objectives were well completed. The participants, especially the young staff in the Nordic industries and research institutions are very satisfied the content of the workshop, which provide them a good chance to re-fresh and updated the knowledge in the radioanalytical chemistry, the lab practices provided them most useful, practical and first-hand information in the radioanalysis of radionculides, the workshop also provided them an ideal platform to know each other who are working in the same field, and to exchange the experiences and idea, it is believed that this activity will help a lot in the improvement of the competence of the Nordic institutions in this field.

Evaluation of the workshop

Questionnaries were distributed to all participants during the workshop to get feedback and evaluate the workshop. Total 31 questionnaires were collected; and a statistic analysis of these questionnaires is presented for each question.

Question 1 : *Do you think the workshop is useful for your work?*

All 31 participants gave a positive answer, of them 17 are very positive.

Question 2*: What do you think was the best thing in this workshop?*

25 of total 31 participants voted the lab practice as the best thing among others; 8 participants also put meeting and exchange idea with people working the same field as the best thing. In addition, the combination of lectures and lab practice as the best thing; broad topics, boat tour and conference dinner, many young students, keep schedule of the lectures, bus transport, bus transport, lunch quality, well organization etc. are also listed.

Question 3*. What do you think was the worst thing in this workshop?*

12/31 choose nothing, and others include: many lectures, small screen of the projector, too short workshop, too many slices in some lectures, too long days, short time lab practice, too long dinner, hotel quality. etc.

Question 4. *How useful did you find the topics of the lectures in the workshop?*

All participants give positive answer, of them 6 gave a very positive answer. 6 answer that some lectures are useful and some are interesting.

Question 5. *How useful did you find the lab practice in the workshop*?

The questionnaires from all lab participants (26) gave positive answer. Of them, 21 gave very positive answer. Most of them mentioned that they are very much preferred the detailed explanation and discussion during the lab practices.

Question 6. *Are there other topics that you would like to be covered in the lecture sessions? If yes, please list it.*

13/31 did not give any suggestions, 18 gave their suggestions, which includes more lab practice related lectures, more environmental related lectures, fuel dissolution, sample preparation, analysis for safeguard, yield determination, intercomparison, nuclear power plants and Fukushima related topics, uncertainty estimation. Most of these suggestions are much more specific interest,

which mainly reflected the personal interests. However, there are 9 comments over all 31 questionnaire on the intensive lectures in 2 days, and a lot of information in many comprehensive lectures.

Question 7. *How do you rate the quality of the lectures (both positive and negative comments welcome)?*

28 give positive answer; among them 10 rate as very high quality, 4/28 rate some are high quality, while some are not. 3/28 comments some lectures contain too much information. 3/28 did not give comments.

Question 8. Do you think should we continue to organize this workshop? If yes, how often and how to organize it? Lab practice first follow by lectures? Focusing to 1-2 topics in the field?

All 31 questionnaires supported to continue this workshop in the future, and give a positive attitude to arrange lab practice before lectures. The workshop frequency of every 2-3 year are the common suggestion, some suggested to have it every year. Only 2/31 suggested focusing on 1-2 topics.

Question 9. *Will you recommend this workshop to your colleagues/friends if we organize it again?*

All 31 questionnaires gave positive answer to this question; among them 12 are very positive.

Question 10. *Can you suggest any improvements to the workshop?*

22 of total 31 collected questionnaires gave their suggestions. Among these suggestions, the suggestion on get the documents of the lectures was solved by published all presentations in PDF file in the NKS website. Another comment suggestion is to include the institutions' name on the nametag, this is actually a misunderstanding during the preparation of the nametag, and could be avoided in the future. Other suggestions include: give some background information or simple theory before lab practice; divide the participants into small groups and focus on their challenge and problems, and do the experiment by the participants; more time for lab practice; More lectures on the basic theory of radioanalytical chemistry; More NPP or decommissioning related topics; Uncertainty and calculation related lectures; quick look at and know what the third group's experiment; separate the lectures into teaching and researches; and more time to open discussion.

Table 1: Statistic analysis of the questionnaires

Question No.	Yes	No	Comments
1	31/31		17 are very possitive
2	31/31		25 voted the lab practice as the best thing.
3		12/31	Intensive lecture and too many information in many lectures are the common answer. Hotel and lunch quality are also listed.
4	31/31		6 of total 31 are very positive.
5	26/26		5 participants did not participate in the lab practice. 21 of total 26 lab practice gave very positive answer.
6		13/31	9 comments on the intensive lectures in 2 days, and a lot of information in many comprehensive lectures.Other suggestions are personal specific.
7	28/31		3 questionnaires did not answer this question. 10 rate as very high quality, 4/28 rate some are high quality, while some are not. 3/28 comments some lectures contain too much information.
8	31/31		All supported to continue this workshop in the future, every 2-3 year are the common suggestion for the frequency of the workshop. Only 2/31 suggested focusing on 1-2 topics.
9	31/31		12 are very positive.
10	22/31		The most common suggestions are accessing the presentations of the lectures, which was solved by published all presentations in PDF file in the NKS website. Another comment suggestion is to include the institutions' name on the nametag, this is actually a misunderstanding during the preparation of the nametag, and could be avoided in the future. Other suggestions are listed in the above summary.

Conclusions:

From the above analysis of the questionnaires, the following conclusion can be drawn:

1) The workshop was very successful. All objectives proposed were reached; this is confirmed by questionnaire investigation and communication with participants.
2) Almost all participants were satisfied with the workshop and thought the workshop is useful for their works. Most of the participants thought the best thing of the workshop is the lab practice, and meeting the Nordic radiochemist working in the same area.
2) All participants supported continuation of such workshop, and will recommend this workshop to their colleagues/friends if it is organized again. Most of them suggested organizing the workshop every 2-3 years.
3) All participants of the lab practices agreed that the laboratory practice is the best part of the workshop, and satisfied with starting the workshop with the lab practice.
4) All participants agree that the lectures are useful and interesting. The lectures with basic knowledge and information on radioanalytical chemistry are especially welcome, and lectures with intensive information seem difficult to be understood by the young participants.
5) Many suggestions were given to improve the quality of the workshop. For example, to divide the participants into small groups depending on their problems and challenges, do the experiment by the participants, less number of lectures, more lectures on basic knowledge of radiochemistry, more lectures related to lab practices, more lab practice, etc. These suggestions should be useful, and could be considered in the organization of next workshop in the future, but the resource and cost might be increased significantly is the lab practice is extended, and more small groups of lab practices are organized, which encourage the organize to find other solution for this requirement.

From the questionnaire investigation, it indicates that many participants are lack of the basic knowledge in radiochemistry, although they are daily working on radiochemical analysis. This feedback also highlighted the necessity and importance of organization of such workshop. This also supports that the workshop is very useful and necessary not only for education of young scientists, but also for improving and keeping the expertise of Nordic laboratories in radioanalytical Chemistry. Basic on communication with other invited lecturers from other European countries, such as Germany, UK,

Switzerland, and Austria, such workshop is in general luck in all Europe, they suggested us to continue this workshop in a more frequent mode. In addition, it was commented that some lectures are too informative to be understood during the presentation, this reflected the narrow knowledge of many young participants, of course also luck of the basic knowledge in radiochemistry.

.Suggestion:

This workshop should be continued, because it will be very benefit to the Nordic society of radioanalytical chemistry, radioecology, and nuclear emergency preparedness by educating the students and young scientist and improving the expertise of Nordic labs in these fields.

It is necessary to establish a Nordic Center for Nuclear and Radiochemistry Education. This center can be divided into a few devision, such radioanalytical Chemistry, Nuclear Fuel cycle, Radioecology, and Radiopharmaceutics, each division can located into a Nordic institution, and offer corresponding education practices.

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