



## OVERVIEW:

In the *Laboratory of Chemistry and Radiochemistry*, research on chemistry of the transactinide elements 104 (Rf), 105 (Db) and 106 (Sg) in model systems with their homologs (Zr, Hf, Nb, Ta, Mo, and W) was continued, and studies on ion-exchange and extraction behaviour of Tc, Re and Os as homologs of Bh(107) and Hs(108) were started. Basing on the law of periodicity, conditions for separation of superheavy elements Rf, Sg, and Bh were adjusted. The cooperations involved the JINR, Dubna, the Institute of Geochemistry and Analytical Chemistry, Moscow, and the Technical University of Dresden. A particularly important achievement was participation of our group in the third experiment in the world on aqueous chemistry of Sg, performed in the summer 1998 in GSI Darmstadt.

The *Environmental Radioactivity Laboratory*, was continuing non-stop records of the ground-level atmospheric radioactivity. Besides, Pu content was determined in two-years collection of rainwater samples. An air monitoring station was recently equipped with a prototype  $\gamma$ -spectrometric scintillation system which, modem-coupled with the central server, will be tested in the Laboratory. For ultra-low-background measurements a muonic chamber was designed and made, and new spectrometer's background was recorded in various shielding configurations.

Research on  $\alpha$ -active and  $\gamma$ -active environmental contaminants in Antarctic samples, supplied by the Institute of Botany of the Jagiellonian University, resulted in an M.Sc. thesis defended in June 1998. Other cooperations of the Laboratory in 1998 have been the following:

- a) determination of  $^{90}\text{Sr}$  and  $^{137}\text{Cs}$  in wild animals bones (Institute of Nuclear Techniques, Technical University, Budapest, Hungary and Medical Academy, Białystok, Poland);
- b) PIXE determinations of trace elements in ASS-500 air filters (Department II of the Institute) and mineralogical studies of collected dusts (Institute of Geological Sciences, Jagiellonian University and the Institute of Geography, Pedagogical University, Kraków);
- c)  $\alpha$ -spectrometric determination of radium isotopes in river waters and bottom sediments (Institute of Geography, UJ) and use of Pu and Cs contaminations as tracers to follow-up natural processes in peat bog (University of Agriculture, Kraków);
- d) preparation of  $\alpha$ -spectrometric sources by electrodeposition (other groups of the Department) and determination of  $^{241}\text{Pu}$  in  $\alpha$ -spectrometric Pu sources (Silesian University, Katowice, Poland);
- e) comparative measurements of  $\gamma$ -background dose rate, using the PMS station, TL detectors and Gamma-Tracer probe (Health Physics Section of the Institute).

In recognition of his expertise in radioecology, Dr Mietelski has been admitted as a Regular Member of the U.I.R. (Union Internationale de Radioecologie). Mrs Jasińska, Mr Kozak and Dr Mietelski received the Prize of the President of the City of Kraków for "Organising and conducting continuous radiological monitoring of the air in Kraków and for the researches at the radioactive contamination of the environment".

The project on construction of the internal target assembly for isotope production was continued in the *Laboratory of Physical Chemistry*, in cooperation with the Cyclotron Section and Division of Mechanical Constructions of the Institute, and with the JINR, Dubna. In the meantime, in pilot experiments on the internal beam of the AIC-144 cyclotron, small activities of  $^{11}\text{C}$  PET tracer were obtained from proton irradiated  $\text{B}_2\text{O}_3$  targets.

A joint project with the Silesian Medical Academy, on applications of  $^{32}\text{P}$  sources (pure  $\beta^-$  emitter) in intravascular brachytherapy (IVBT), was started. Chemical and ionic methods of preparation of  $^{32}\text{P}$  sources and their TL dosimetry were tested in cooperation with the Laboratory of the Ion Implanter and with the Health Physics Section of the Institute.

Measurements of the activity of selenoenzymes in the context of human thyroid health or disease were continued in cooperation with the Medical College of the Jagiellonian University, and with the Rowett Research Institute, Aberdeen, Scotland.

for Prof. Zdzisław Szegłowski  
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