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Study of new filter properties ¹³⁷Cs vapour capture at high temperature

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Vitrification of radioactive wastes and high temperature synthesis of glass and ceramics for ionizing radiation sources, containing Cs-137, is accompanied by discharge of its vapours. The off-gas contaminated by Cs-137 must be cleaned up using different trapping systems.

In general two methods of Cs-137 vapour catching are possible, differing both in process character (nature) and realization place in technological scheme:

- “wet” method – “low-temperature” Cs-137 vapour condensation in system of gas cleaning (condensers, scrubbers, HEPA-filters). This method leads to contamination of communications and to formation secondary liquid RAW, which require additional repossessing.
- “dry” method – “high-temperature” Cs-137 vapour chemisorptions. This method allows fixing Cs-137 in stable crystalline and amorphous phases.

Earlier it was shown that porous inorganic materials with high content of silica- alumina amorphous phase could be used for effective capturing of Cs-137 vapours. Effectiveness of filter depends on the total porosity; porous structure and aerodynamic resistance to off-gas flow. To study these parameters a laboratory scale test facility was built at the KRI.

The following three methods are used to evaluate dust and aerosol capture efficiency at room temperature:

- weighing method: sample the dust using special certificated analytical filters followed by weighing of the absorbed precipitate. The filters are sealed in the filter holders;
- radiometric method: if an isotope spike is used, the dust is sampled using the analytical filters as described above followed by measurements of absorbed activity using conventional methods;
- aerosol particle concentration measurements: using laser counters for aerosol particle concentrations. This method determines fraction decontamination factors for the particle sizes ranging from 0.2 to 5 µm.

Report will summarize obtained analytical data and describe the dependence of filter effectiveness at different rates off-gas flow.

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