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Chromatographic separation of In-111 from irradiated cadmium by using ampholyte Chelex-100 and carbon sorbent

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Early diagnosis of malignant tumors remains one of the urgent problems of the modern medicine. To create a new generation of radiopharmaceuticals on the base of In-111, it is necessary to use solutions with a minimum of chemical and radionuclide impurities. In this context becomes more urgent the search of the new modern sorbents with high affinity for indium and with good kinetic characteristics.

The distribution of carrier-free In-111 between aqueous solutions (chloride –acetate) and chelating ion exchange resin Chelex-100 and also the carbon sorbent SKN-1K, which is used for hemosorption in medicine, was studied in static and dynamic conditions. The dependences of static distribution coefficients of In-111 from the acidity of the solution contacting with sorbent, were determined. It was found for both sorbents that the optimum conditions of sorption were in the range of pH 4-7. The influence of macro amounts of cadmium and flow rate of the solution on the completeness of the radionuclide recovery was studied in dynamic conditions. The modes of subsequent desorption of In-111 with solutions of hydrochloric acid and its purification from the trace amounts of cadmium on the anion exchange resin BioRad AG1x8 were worked-out. The purification coefficient for cadmium was $1,5 \times 10^3$.

The results of the investigation indicate the prospects of application of the studied sorbents in radiochemical separation of carrier-free ^{111}In from macro amounts of cadmium and purification of radionuclide from chemical and radionuclide impurities.

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