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New method for Sc-47 production in nuclear reactor Maria at Świerk

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Problems

Radionuclides with medium energy beta emission and a several day half-life are attractive candidates for radioimmunotherapy. Among the most promising in this category is 47Sc. The methods of production high activities of carrier free 47Sc was already described. Enriched 47TiO2 targets were irradiated with high energy neutrons (En>1 MeV) to produce 47Sc via the 47Ti(n,p)47Sc reaction. Authors also developed a new separation scheme based on dissolution of TiO2 target in hot concentrated H2SO4 and slow evaporation of the solution. To avoid slow dissolution and complicated separation process we propose new method based on irradiation Li247TiF6 salt and easy dissolution of irradiated target in diluted HF solution.

Materials and Methods

Sample of 10 mg of Li247TiF6 was irradiated for 20 h in fast neutron flux about 1014 n cm-2 s-1. The irradiated target was dissolved in 1 M HF solution. The 47Sc was separated from the target using anion exchange resin Dowex-1 with 0.4 M HF + 0.1 HNO3 solution as eluent. The eluted 47Sc fraction was 2 times evaporated with concentrated HCl and dissolved in 0.1 M HCl. The 47Sc was adsorbed on cation exchange resin and eluted with 0.5 M molar of amonium acetate.

Results and conclusions

Using presented procedure we obtained carrier free 30 MBq activity sample of 47Sc. The obtained samples were used for labeling DOTATATE bioconjugate with more than 90% efficiency.

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