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Highly enriched target material for the production of radiopharmaceutical isotopes: the use of electromagnetic separation

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One limitation of the production of some radioisotope for medical use is the possibility to obtain them with a sufficient purity, not only in terms of chemical contaminant, but also in terms of isotopes. Different production techniques are available but at least for some particular isotopes, enriched primary matter is mandatory in order to achieve sufficient isotopic purity and not produce prohibitive contaminants.

This difficulty can be overcome through different possible enrichment techniques, one of them being electromagnetic separation.

As for a “proof-of-concept” experiment, Tb isotopes production has been chosen. They can be produced through nuclear reaction (p,x) on Gd isotopes. The first step of this study is to measure the production rates of such pure isotopes and their achievable isotopic purity.

The talk will present possibilities related to the use of one of the last high performance electromagnetic mass separator in Europe, SIDONIE, located at CSNSM-Orsay-France [1-3]. After a description of the machine, some “proof of principle” experiments will be described, as well as some first results. Gd-158 has been chosen due to the possibility to detect and quantify it by prompt-gamma experiment and to measure its contamination with its neighbour, Gd-157. We have shown the possibility to obtain ratio 157Gd/158Gd from $10E-4$ to $10E-5$, with relatively high currents, leading to the possibility to produce highly enriched target materials. Perspectives of this preliminary study will be presented to conclude the talk.

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