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Nuclear-Based Monitoring of Industrial Mass Flow II: The Potential Use of Small Transportable Neutron Generators

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Radiotracers have been widely used throughout industry to optimize processes, solve problems, improve product quality, save energy and reduce pollution. Stricter regulatory regimes lately demand, however, that the radioactive labels are as short-lived as practically possible in order to reduce radiation load to personnel involved. This requirement introduces some challenges. Short half-lives limit the permissible transportation time from radionuclide production facilities like nuclear reactors or particle accelerators. Thus, the use of tracer technology in process monitoring on remote industrial sites is hampered. One remedy to cope with this problem is to develop and apply radiotracer generators based on radionuclide generators. These are again based on suitable and specific mother-daughter nuclear genetic relationships with a long-lived mother and a short-lived daughter.

This presentation describes various types of generator principles from column-based equipment where the mother nuclide is fixed on a solid support and the daughter is eluted in an external liquid, systems where the mother radionuclide is exclusively dissolved in one of two immiscible liquids and where daughter separation takes place in a liquid-liquid extraction process, to systems where the mother is a gas and the daughter a solid (or the other way around) and where the separation process includes a cryogenic step. The presentation also describes which generators are commercially available today for industrial monitoring, and which type of development work is needed to extend the selection of desirable generators.

Country/Organization invited to participate

Norway

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