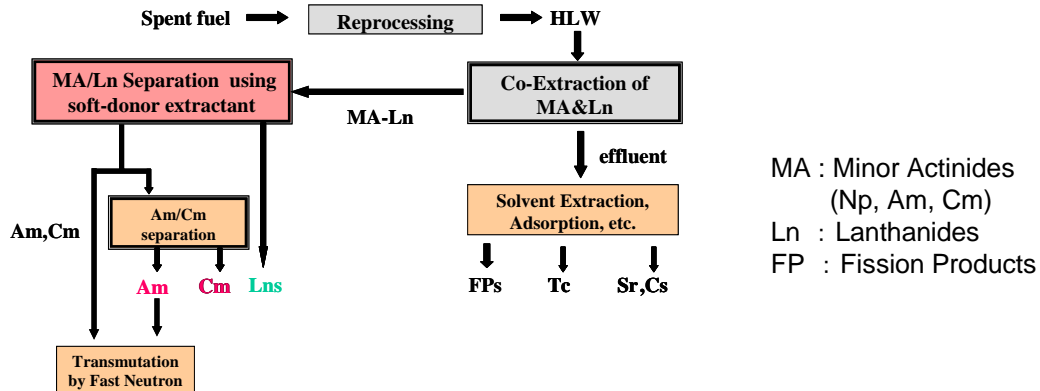


Extractants for Separation of Trivalent Minor Actinides from Lanthanides

Reduction of radioactive toxicity of HLW is very important. If long-lived radioactive nuclides containing actinides (An) are removed from HLW and the nuclides can be converted to short-lived ones by transmutation technology using high-energy neutron by fast reactors or accelerators, the environmental load of HLW will be largely reduced. However, lanthanides (Ln), whose total amount corresponds to up to 30 times that of An in HLW, adversely affects on the efficiency of the transmutation of An, because the transmutation target must be minimize and Ln absorb a large proportion of neutron. Therefore, the separation of An from Ln is one of essential subjects to establish the transmutation technology.

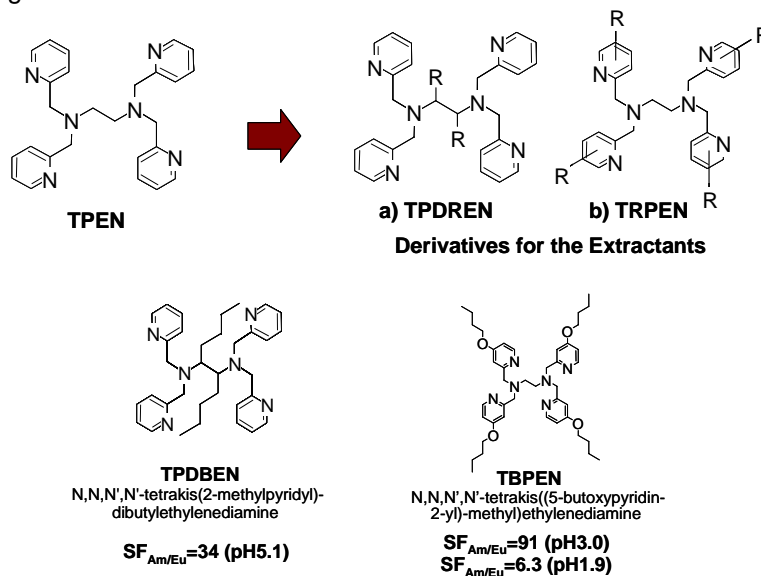


Block Flow Diagram of Partitioning Process

Purpose of this work: Development of the new extractants to separate the trivalent actinides (An(III)) from lanthanides (Ln(III)).

Separation of An(III) from Ln(III) is one of the most challenging issues, because of their similarity of chemical properties. One rational approach is to use a soft-donor extractant. Nitrogen-based soft-donor extractants have been attracted attention as a means of establishing a new sustainable separation process which has the feature of organic solvent waste free.

N,N,N',N'-tetrakis(2-methylpyridyl)ethylenediamine (TPEN) demonstrates 100-fold preference for Am(III) over Ln(III) from the difference between stability constants. The activity to develop the TPEN based extractants have been conducting.



Separation Performance of the Derivatives of TPEN

This work is under collaboration with Universities.