Development of Partitioning Process Including Technetium Separation from High-Level Liquid Waste

M.Kubota, I.Yamaguchi, Y.Morita, I.Yamagishi

Department of Chemistry and Fuel Research, Japan Atomic Energy Research Institute

Tokai-mura, Ibaraki-ken, 319-11, Japan

1. Introduction

Nuclear energy is the most promising option for the future generation when considering the global environmental protection. The management of high-level radioactive waste (HLW) containing long-lived nuclides is one of the most important problems to be solved before the future deployment of nuclear energy in the global scale.

In 1988, Japan´s Atomic Energy Commission published a report entitled "Long Term Program for Research and Development on Nuclide Partitioning and Transmutation Technology", which plots a course for technological development up to the year 2000. The "OMEGA" program is an acronym derived from Options Making Extra Gains of Acitinides and fission products.

In this program, a partitioning technology should be developed for separating elements in high-level liquid waste (HLLW) into four groups; transuranic elements (TRU), Sr-Cs, Tc-platinum group metals (PGM) and others. Among them, long-lived nuclides such as TRU nuclides should be transmuted by using an actinide burner reactor, FBR, etc.

2. Development of partitioning process

At the Japan Atomic Energy Research Institute (JAERI), development of a partitioning method started about 20 years ago. From 1973 to 1984, a partitioning process was developed for separating elements in HLLW into three groups; TRU, Sr-Cs and others [1,2] . The partitioning process consists of three steps; the first is solvent extraction of U and Pu with tributylphosphate (TBP), the second is solvent extraction of Am and Cm with diisodecylphosphoric acid (DIDPA), and the third is adsorption of Sr and Cs with inorganic ion exchangers. The process was demonstrated by using real HLLW . More than 99.99% of the Am and Cm were extracted with DIDPA.

Since 1985, a four group partitioning process has been developed, in which a step for separating the Tc-PGM group was developed in addition to