EVAPORATION OF RHENIUM FROM NITRIC ACID AND SODIUM NITRATE SOLUTIONS AT ATMOSPHERIC PRESSURE

K. ITO,

Institute of Multidisciplinary Research for Advanced Materials, Tohoku University

Sendai, 980-8577, Japan

To understand the fundamentals of evaporation for technetium in the aqueous solutions, rhenium evaporation was investigated at atmospheric pressure. A glass evaporation apparatus consists of an evaporation vessel, a cooling condenser, and a distillate-measuring reservoir.

An water of 1 L was fed continuously at the flow rate of 14 cm^3/min using a roller pump into the vessel that was heated to 135 by an internal glass coil filled with silicone oil. Volumes of distillate in the reservoir and residual water in the vessel were measured periodically. Results showed the distillation rate of water to be equal the feed rate of 14 cm^3/min, when at least 40% of heating coil was immersed in the sample solution. When less than 15% of the heating coil was immersed, evaporation efficiency was low.

Each Re solution containing 0.01, 0.05, 0.1, 0.5 M HNO_3 and $NaNO_3$ was fed into the vessel heated at 135 . The Re concentration in the distillate was analysed by a Hewlett Packard 4500 Series ICPMS and the NO_3^- concentration was determined by Dionex QIC analyser.

The decontamination factor obtained from the Re concentration in the distillate and that in the feeding solution in the study was 9.8×10^3, which is nearly equal to that of the operational results at the Chalk River Laboratory in Canada. The value is less than that of results by means of thin film evaporation in vacuum by a factor of 100. The NO_3^- percentages were nearly constant despite increasing HNO_3 concentrations; however the ratios decreased with increasing $NaNO_3$ concentrations.

Adhering Re percentages to the inside of the vessel- lid and to the condenser were also determined by ICPMS.