

## Effect of the Crucible Cover on the Distillation of Cadmium

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### Abstract

The distillation of liquid cathode is necessary to separate cadmium from the actinide elements in the pyroprocessing since the actinide deposits are dissolved or precipitated in a liquid cathode. It is very important to avoid a splattering of cadmium during evaporation due to the high vapor pressure. Several methods have been proposed to lower the splattering of cadmium during distillation. One of the important methods is an installation of crucible cover on the distillation crucible. A multi-layer porous round cover was proposed to avoid a cadmium splattering in our previous study. In this study, the effect of crucible cover on the cadmium distillation was examined to develop a splatter shield. Various surrogates were used for the actinides in the cadmium. The surrogates such as bismuth, zirconia, and tungsten don't evaporate at the operational temperature of the Cd distiller due to their low vapor pressures. The distillation experiments were carried out in a crucible equipped with cover and in a crucible without cover. About 40 grams of Cd was distilled at a reduced pressure for two hours at various temperatures. The mixture of the cadmium and the surrogate was heated at 470 ~ 620°C. Most of the bismuth remained in the crucible equipped with cover after distillation under 580°C for two hours, whereas small amount of bismuth decreased in the crucible without cover above 580°C. The liquid bismuth escaped with liquid cadmium drop from the crucible without cover. It seems that the crucible cover played a role to prevent the splash of the liquid cadmium drop. The effect of the cover was not clear

for the tungsten or zirconia surrogate since the surrogates remained as a solid powder at the experimental temperature. From the results of this work, it can be concluded that the crucible cover can be used to minimize the deposit loss by prevention of escape of liquid drop from the crucible during distillation of liquid cathode.

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