

Development of Platinum Group Element analysis in sedimentary rocks

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To do the PGE analysis of deep-sea sediments, we should pre-concentrate PGEs before ICP-MS analysis. A fire-assay procedure was used with Tellurium co-precipitation for better PGE recovery. The PGE standard samples are all from basic PGE ores. PGEs were recovered at 80-100 % with those samples. We found that low recovery yield (40-50 %) with the silica rich samples such as cherts. The cause for this was in the fire-assay process. Increase in viscosity of the alkali melt of the fire-assay, due to increase in silica content, caused poor recovery of NiS precipitate from the melts. This was not improved with different fire-assay setups. To overcome the recovery problems, a large amount of Rh solution was doped prior to fire-assay, and the Rh recovery was monitored and other PGE recoveries were corrected for. This resulted in almost complete correction (95-110 %) for the standard samples. We therefore employed this method throughout our analysis. Obtained lower limits of quantification was about 0.01 ppb for all PGEs with this method, which enables us to analyze entire PGEs (except for Rh) in the chert samples.

Samples analyzed were cherts obtained from above and below of the K-T boundary at Inuyama section, Japan. Obtained results are Ir = 0.01-0.08 (ppb), Ru = 0.1-0.3, Pt = 0.1-0.7, and Pd = 0.4-1.9, which are about 1/100000 to 1/1000 chondritic levels. Except for Pt, all samples show strong heavy-PGE enriched patterns, which are similar with the averaged upper crustal concentrations. Pt shows negative anomalies in most of the samples. This might relate with anomalous PGE precipitation in marine processes or deep-marine diagenesis. More studies are needed for this anomalous behavior in Pt. However, the precise PGE analysis attained by the Rh-corrected fire-assay Te co-precipitation ICP-MS enables us to discuss the origin of fine fluxes in deep-sea sediments.