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THE SEPARATION OF THE FOUR PLATINUM GROUP METALS PALLADIUM, RHODIUM, IRIDIUM AND PLATINUM

P. C. Stevenson, A. A. Franke, R. Borg, and W. Nervik

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The separation of the four platinum group metals palladium, rhodium, iridium and platinum has been accomplished very simply at room temperature by the use of Dowex-50 cation exchange resin. Acting on some preliminary observations on rhodium by C.I. Browne[1], we have found that a mixture of these elements may be separated as follows: the solution is taken near dryness repeatedly with a mixture of nitric and perchloric acids until every trace of halide ion is removed and the ions are left in a small volume (0.2 - 0.5 ml.) of fuming perchloric acid. The solution is then diluted to a volume of approximately ten milliliters with distilled water and is run into the top of an ion-exchange column packed with Dowex-50 resin. Under these conditions platinum will pass through the column while the other three elements adhere. The column may be washed with distilled water to remove the last traces of platinum. If any halide ions remain in the solution, the platinum fraction will contain small amounts of the other three elements.

Palladium is then stripped from the column with dilute (0.05 to 0.5 M) hydrochloric acid. This process occurs quite readily.

Rhodium elutes gradually from the column with 2 M hydrochloric acid This process is rather slow. Experiments are in progress to determine the effect of raising the temperature of the eluting solution to increase the rate of the reactions involved.

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1 C.I. Browne, private communication.

Iridium is removed with 4 to 6 M hydrochloric acid. This process, like the elution of rhodium, is rather slow.

Our experiments appear to show that sulfate ion prevents the adsorption of rhodium and iridium by the resin, presumably by forming neutral or anionic complexes with the metal cations.

This separation has been used in conjunction with other simple chemical steps for the radiochemical separation of pure rhodium in good yield from uranium fission products.

Further research will be done on this process.