

Mutual Separation of Palladium (II) and Platinum (IV) from Hydrochloric Acid Solutions Using *m*-Phenylene Diamine-Containing Agents

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m-Phenylene diamine-containing compounds were synthesized via a one-pot process and subsequently used as new precipitating agents (**PA1** and **PA2**). The precipitation of Pd and Pt was studied using **PA1** and **PA2** as metal precipitants. While **PA1** exclusively precipitated Pd from a HCl solution containing Pd, Pt, and base metals, **PA2** achieved precipitation of both Pd and Pt from the metal-containing HCl solution. Mutual separation of Pd and Pt was achieved by using **PA1** and **PA2** in the first and second precipitation steps, respectively. Separation tests at varying agent loadings revealed that Pd and Pt were precipitated by forming of an ion-pair composed of a metal chloro-complex anion (i.e., $[\text{PdCl}_4]^{2-}$ or $[\text{PtCl}_6]^{2-}$) and one precipitating agent molecule (i.e., divalent cation). The stoichiometric ratio of the ion-pairs was in agreement with the atomic ratios estimated from X-ray photoelectron spectroscopy results. Since the precipitation mechanism herein was based on the formation of an ion-pair, the cations of the precipitating agents only recovered Pd and Pt chloro-complex anions when the cations of the base metals were present in the solution. The different hydrophobicities of the precipitating agents enabled mutual separation of Pd and Pt.

Keywords : platinum group metals / metal precipitate / mutual separation / precipitating agent