白金の回収を目指したトリオクチルホスフィンオキシド誘導体化学修飾シリカゲルの合成と吸着挙動

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Synthesis of Silica Gels Modified Chemically with Trioctylphosphine Oxide Derivatives for Platinum Recovery and Investigation of Its Adsorption Behavior ([1] *Faculty of Systems Engineering, Wakayama University*) ○Ichiro Iwasaki,[1] Yoshio Nakahara,[1] Setsuko Yajima[1]

Platinum exhibits excellent chemical stability and heat resistance etc., therefore it is widely used in applications such as exhaust gas purification catalysts. On the other hand, it has been reported that hexachloroplatinate(IV) ions are coordinated with four molecules of trioctylphosphine oxide (TOPO) and two protons, and can be extracted into the organic phase[1,2]. In this study, various types of silica gels were used as substrates, and they were chemically modified with TOPO derivatives. Their adsorption behavior of platinum was investigated under different conditions.

TOPO derivatives bearing phosphine oxide moieties and triethoxysilyl groups (Fig. 1) were synthesized and chemically modified onto silica gels to prepare adsorbents. The TOPO modification density of the resulting adsorbents was estimated by elemental analysis. Using these adsorbents, the adsorption behavior of platinum was examined by varying the solution's pH and reaction time, and the relationship of the adsorption of platinum behavior with TOPO modification density was evaluated.

Keywords : Phosphine Oxide Derivative, Silica Gel, Chemical Modification, Platinum, Adsorption Behavior

白金は化学的な安定性や耐熱性などに優れており、自動車の排ガス浄化触媒などに利用されている。一方、ヘキサクロロ白金(Ⅳ)酸イオンは 4 分子のトリオクチルホスフィンオキシド(TOPO)と 2 つのプロトンが配位することで、有機相に抽出されると報告されている[1,2]。本研究では、基材として複数種類のシリカゲルを用い、TOPO 誘導体で化学修飾し、様々な条件下における白金の吸着挙動を検討した。

ホスフィンオキシド部位とトリエトキシシリル基を備えた TOPO 誘導体(Fig.1)を合成後、シリカゲルに化学修飾し、吸着剤を得た。得られた吸着剤を元素分析することで TOPO の修飾密度を見積もった。これらの吸着剤を用いて、溶液の pH、反応時間を変化させて白金の吸着挙動を調べ、TOPO 修飾密度との関係について検討した。

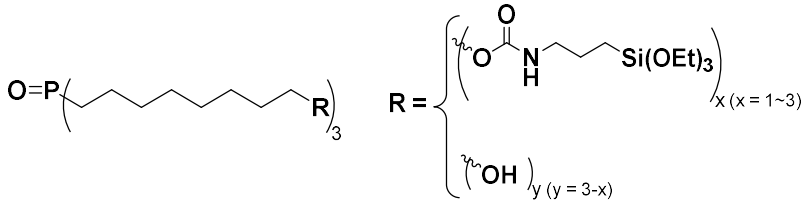

Fig.1 白金回収のために設計・合成した TOPO 誘導体の分子構造

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2) K. Inoue *et al*., *Solv. Extr. Ion. Exch*., **1989**, 7, 1111-1119.