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**Novel chitosan derivatives for recovery of platinum and palladium from aqueous acidic solutions**

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Platinum (Pt) and palladium (Pd) possess favorable physical and chemical properties for wide applications in many fields such as catalysts in industries, jewellery, fuel cells, and electronics. The market demand of Pt and Pd is increasing because of the natural reserves of these metals are limited and located in few regions of the world. Therefore, there is a great concern in recovery of Pt and Pd from secondary sources for sustainable use of these metals. Chitosan is a naturally occurring polymer which has been widely investigated by many researchers as a metal recovering agent. However, there are some limitations in the use of chitosan as a metal recovering agent including low acid stability and poor mechanical properties. In order to resolve these issues, three new chitosan derivatives were prepared in this work and employed for Pd (II) and Pt (IV) removal from acidic solution. The prepared derivatives are 1, 10-phenanthroline-2, 9-dicarbaldehyde cross-linked chitosan (Ch-PDC), [2, 2'-bipyridine]-5, 5'-dicarbaldehyde cross-linked chitosan (Ch-BPDC), and glutaraldehyde cross-linked chitosan followed by grafting with 8-hydroxyquinoline-2-carbaldehyde (Ch-GA-HQC). The adsorption was very fast and reaches equilibrium within 30 min. The adsorption better simulated by Langmuir isotherm compared to Freundlich isotherm. The maximum adsorption capacity of Pd (II) was found to be 262, 155 and 340 mg Pd/g of Ch-PDC, Ch-BPDC, Ch-GA-HQC, respectively. And, the maximum adsorption capacity of Pt (IV) was 114, 96 and 204 mg Pt/g of Ch-PDC, Ch-BPDC, Ch-GA-HQC, respectively. Compared to other adsorbents in literature, the adsorption capacity of the synthesized chitosan derivatives was relatively high. Therefore, these adsorbents are very promising for Pd (II) and Pt (IV) recovery from aqueous acidic solutions. Finally, the relevance of these adsorbents for Pd (II) adsorption in industrial setting was tested using palladium containing industrial wastewater.

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