

Accepted Manuscript

Pd(II) and Pt(IV) sorption using alginate and algal-based beads

Shengye Wang, Thierry Vincent, Jean-Claude Roux, Catherine Faur, Eric Guibal

PII: S1385-8947(16)31791-0
DOI: <http://dx.doi.org/10.1016/j.cej.2016.12.039>
Reference: CEJ 16204

To appear in: *Chemical Engineering Journal*

Received Date: 6 October 2016
Revised Date: 8 December 2016
Accepted Date: 9 December 2016

Please cite this article as: S. Wang, T. Vincent, J-C. Roux, C. Faur, E. Guibal, Pd(II) and Pt(IV) sorption using alginate and algal-based beads, *Chemical Engineering Journal* (2016), doi: <http://dx.doi.org/10.1016/j.cej.2016.12.039>



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 **Pd(II) and Pt(IV) sorption using alginate and algal-based beads**

2

3 **Shengye WANG,⁽¹⁾ Thierry VINCENT,⁽¹⁾ Jean-Claude ROUX,⁽¹⁾ Catherine FAUR,⁽²⁾**
4 **and Eric GUIBAL^{(1)*}**5 ⁽¹⁾Ecole des mines d'Alès, Centre des Matériaux des Mines d'Alès, 6 Avenue de
6 Clavières, F-30319 Alès cedex, France.

7

8 ⁽²⁾Institut Européen des Membranes-IEM (UMR 5635 CNRS-ENSCM-UM2) – Equipe
9 Génie des Procédés Membranaires, Université de Montpellier cc047, Place Eugène
10 Bataillon, 34095 Montpellier Cedex 5, France.11 *: Eric GUIBAL – email: eric.guibal@mines-ales.fr – Ph: +33 (0)46678273412 **Abstract**

13 The incorporation of glutaraldehyde-crosslinked polyethyleneimine (GLA-PEI) in algal
14 biomass beads (AB/PEI) substantially increases the sorption capacity for Pd(II) and Pt(IV)
15 compared to pure algal beads (*Laminaria digitata*) prepared by an original one-pot synthesis
16 procedure (using a homogeneous ionotropic Ca-gelation, without addition of supplementary
17 alginate). The sorption properties are compared to a reference material (alginate beads).
18 Sorption efficiency increases with pH in relation with deprotonation of carboxylate and amine
19 groups, limitation of the competition effect of counter anions and effect of metal speciation.
20 Sorption isotherms (fitted by the Langmuir equation) show maximum sorption capacities
21 close to 1.28 mmol Pd g⁻¹ and 0.59 mmol Pt g⁻¹ for the composite sorbent at pH 2.5, with a
22 marked preference for Pd(II) against Pt(IV) (sorption isotherms in bi-component solutions),
23 especially for alginate and algal beads that are more selective than AB/PEI (an excess of
24 chloride ions limits this selectivity). The uptake kinetics are controlled by the resistance to
25 intraparticle diffusion though the kinetic profiles are well fitted by the pseudo-second order
26 rate equation. The drying conditions have critical impact on the diffusion properties: freeze-
27 drying limits the irreversible collapse of the porous structure (which happens with air-drying):
28 the presence of cellulose-like fibers (and/or agglomerates of GLA-PEI) in AB and AB/PEI
29 limits this impact.

30 **Keywords:** platinum group metals; alginate; algal beads; PEI/algal composite beads; sorption
31 isotherms; uptake kinetics.

Download English Version:

<https://daneshyari.com/en/article/6466584>

Download Persian Version:

<https://daneshyari.com/article/6466584>

[Daneshyari.com](https://daneshyari.com)