Research paper

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PII: S0939-6411(16)30983-3
DOI: http://dx.doi.org/10.1016/j.ejpb.2017.06.001
Reference: EJPB 12527

To appear in: *European Journal of Pharmaceutics and Biopharmaceutics*

Received Date: 20 December 2016
Revised Date: 20 April 2017
Accepted Date: 1 June 2017

Please cite this article as: E.H. El Atmani, A. Benelyamani, H. Mouadili, S. Tarhouchi, S. Majid, K. Touaj, L. Lebrun, M. Hlaibi, The oriented processes for extraction and recovery of paracetamol compound across different affinity polymer membranes. Parameters and mechanisms, *European Journal of Pharmaceutics and Biopharmaceutics* (2017), doi: http://dx.doi.org/10.1016/j.ejpb.2017.06.001

The oriented processes for extraction and recovery of paracetamol compound across different affinity polymer membranes. Parameters and mechanisms

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Project: PPR2 (MESRSFC – CNRST)

Abstract

Membrane processes represent one of the most promising technologies for separation and extraction in modern industries, because they have several advantages. Today these processes are an important research topic, including affinity polymer membranes that are highly efficient for oriented processes.

Three affinity polymer membrane types containing lipophilic compounds, *methyl cholate* (**MC**) and *cholic acid* (**CA**) as extractive agents were prepared and characterized. They have been used to extract active ingredient paracetamol (acetaminophen), from concentrated solutions (0.08 to 0.01 M). Substrate acetaminophen is an important active ingredient and its recovery as a pure compound, is very useful for the pharmaceutical industry. These affinity polymer membranes were adopted to perform experiments on a facilitated extraction process of this substrate at different medium acidities and temperatures. *Macroscopic parameters*, permeabilities (***P***) and initial fluxes (J_0) for a facilitated extraction of this substrate through each membrane were determined. The results indicate that values of initial fluxes (J_0) of the extracted substrate are related to its initial concentration C_0 by a saturation law, which allowed to determine *microscopic parameters*, apparent diffusion coefficients (***D****) and association constants (K_{ass}) of formed entity (substrate - extractive agent) (**ST**). The results show a clear influence of temperature and acidity factors on the evolution of these parameters and membrane performances in this studied process. *Activation parameters* (E_a, $\Delta H^{\neq}$, and $\Delta S^{\neq}$) were determined and the values indicate that high performances of these membrane types are certainly related to the movement nature of the substrate across the organic phase, and the structures of the substrate and the extractive agent.

Keywords: affinity polymer membranes; oriented process; facilitated extraction; permeability; flux; apparent diffusion coefficient; association constant; activation parameters.

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