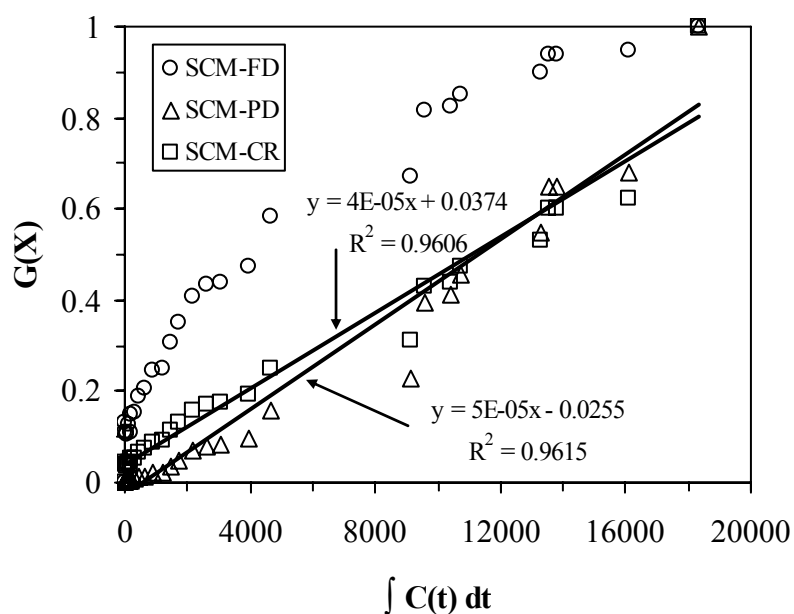
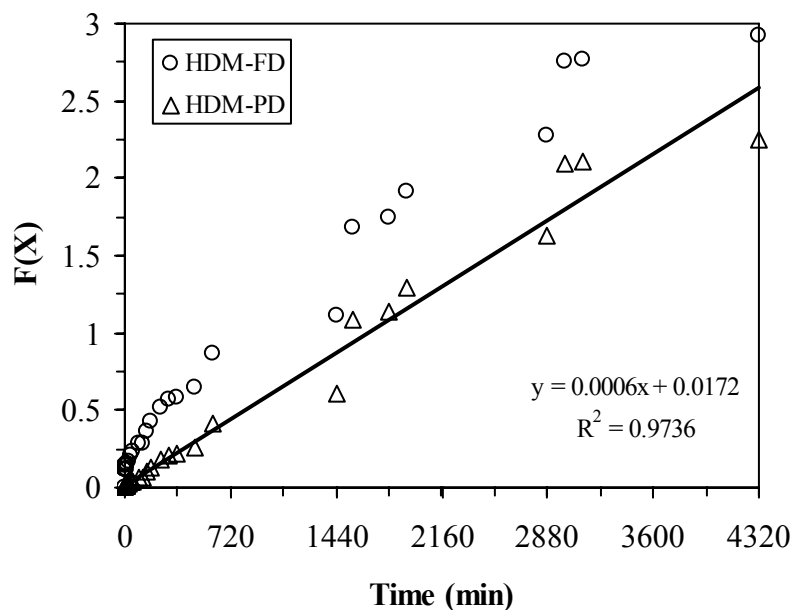


Additional material

Table A: Linearization of kinetic data – Simplified equations for ion-exchange mechanisms using homogeneous diffusion model (HDM) and shrinking core model (SCM) with film diffusion (FD), particle diffusion (PD) and chemical reaction (CR) control (X represents the fractional approach to equilibrium,  $q(t)/q_{eq}$ : ratio of sorption capacity at time t and at equilibrium).

Model and controlling step	F(X)/G(X) (y-axis)	Time parameter (x-axis)
HDM-FD	$F(X) = -\ln(1 - X)$	$t$
HDM-PD	$F(X) = -\ln(1 - X^2)$	$t$
SCM-FD	$G(X) = X$	$\int_0^t C(t) dt$
SCM-PD	$G(X) = 3 - 3(1-X)^{2/3} - 2X$	$\int_0^t C(t) dt$
SCM-CR	$G(X) = 1 - (1-X)^{1/3}$	$\int_0^t C(t) dt$



Example of kinetic modeling with the Homogeneous Diffusion Models and Shrinking Core Models ((C3L resin;  $C_0$ : 10 mg Bi L<sup>-1</sup>; SD: 250 mg L<sup>-1</sup>; [HCl]: 1 M; v: 500 rpm) (Reprinted from Water Research, 42, K. Campos, R. Domingo, T. Vincent, M. Ruiz, A.M. Sastre, E. Guibal, Bismuth recovery from acidic solutions using Cyphos IL-101 immobilized in a composite biopolymer matrix, 4019-4031, Additional material, Copyright (2008), with permission from Elsevier).