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Transport of dilute organics through dense membranes: assessing impact on membrane-solute interactions

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Abbreviations

$C_{i,bulk}$ - concentrations of the solute i in the bulk (-)

$C_{i,bl}$ - concentrations of the solute i in the boundary layer (-)

$C_{i(m)}^{perm}$ - concentrations of the solute i in the membrane in the permeate (-)

C_i^{perm} - concentrations of the solute i in the permeate (-)

$C_{i,m}^*$ - equilibrium concentration in the membrane (wt./wt.)

$C_{i,f}^*$ - equilibrium concentration in the liquid (wt./wt.)

$D_{i,j}$ - diffusion coefficient of the solute in the solvent calculated using the Wilke-Chang equation ($m^2 s^{-1}$)

D_i - diffusion coefficient of the solute i ($m^2 s^{-1}$)

$D_i(t)$ - time-dependent diffusion coefficient ($m^2 s^{-1}$)

$D(t=\infty)$ - diffusion coefficient of compound i at the steady state ($m^2 s^{-1}$)

EF (-) - enrichment factor

EtAc - ethyl acetate

HxAc - hexyl acetate

H_i - Henry's law coefficient (Pa^{-1})

$I_i(t)$ - electrical signal intensity of the compound i in the instant t [A]

$I_i(t=\infty)$ - electrical signal intensity of the compound i at the steady state ($t=\infty$)

$J_{i,bl}$ - flux across the boundary layer ($m^{-3} m^{-2} s^{-1}$)

$J_{i,m}$ - flux across the membrane ($m^{-3} m^{-2} s^{-1}$)

$J_{i,ov}$ - overall flux ($m^{-3} m^{-2} s^{-1}$)

J_i - partial flux of the compound i ($m^{-3} m^{-2} s^{-1}$)

J_T - the total flux ($m^{-3} m^{-2} s^{-1}$)

$J_i(t=\infty)$ - partial flux in the steady state ($m^{-3} m^{-2} s^{-1}$)

$k_{i,bl}$ - boundary layer mass transfer coefficient ($m s^{-1}$)

$k_{i,ov}$ - overall mass transfer coefficient ($m s^{-1}$)

$k_{i,m}$ - membrane mass transfer coefficient ($m s^{-1}$)

z_{bl} - boundary layer thickness (m)

L - thickness of the membrane (m)

P - permeability of a solute i ($m^2 s^{-1}$)

P_i^G - gas-phase permeability of compound i . ($m^2 s^{-1} Pa$)

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