LEY DE FICK DE LA DIFUSIÓN

PARA DIFUSIÓN DE A EN B

$$\mathbf{j}_A = -\mathscr{D}_{AB} \nabla C_A$$

Coordenadas Rectangulares

$j_{A,x} = -\mathscr{D}_{AB} \dfrac{\partial C_A}{\partial x}$	$j_{A,y} = -\mathscr{D}_{AB} \dfrac{\partial C_A}{\partial y}$	$j_{A,z} = -\mathscr{D}_{AB} \dfrac{\partial C_A}{\partial z}$

Coordenadas Cilíndricas

$j_{A,r} = -\mathscr{D}_{AB} \dfrac{\partial C_A}{\partial r}$	$j_{A,\theta} = -\dfrac{\mathscr{D}_{AB}}{r} \dfrac{\partial C_A}{\partial \theta}$	$j_{A,z} = -\mathscr{D}_{AB} \dfrac{\partial C_A}{\partial z}$

Coordenadas Esféricas

$j_{A,r} = -\mathscr{D}_{AB} \dfrac{\partial C_A}{\partial r}$	$j_{A,\theta} = -\dfrac{\mathscr{D}_{AB}}{r} \dfrac{\partial C_A}{\partial \theta}$	$j_{A,\phi} = -\dfrac{\mathscr{D}_{AB}}{r \operatorname{sen}\theta} \dfrac{\partial C_A}{\partial \phi}$

NOTACIÓN:

$\mathbf{j}_A$ = densidad de flujo molar por difusión de A (kmol/m²·s)

$\mathscr{D}_{AB}$ = difusividad de A en B (m²/s)

C_A = concentración molar de A (kmol/m³)

∇C_A = gradiente de concentración de A (kmol/m⁴)

ECUACIÓN GENERAL DE FLUJO

$$\mathbf{n}_A = -\mathscr{D}_{AB}\nabla C_A + \frac{C_A}{C}\sum \mathbf{n}_i$$

Coordenadas Rectangulares

$n_{A,x} = -\mathscr{D}_{AB}\frac{\partial C_A}{\partial x} + \frac{C_A}{C}\sum n_{i,x}$	$n_{A,y} = -\mathscr{D}_{AB}\frac{\partial C_A}{\partial y} + \frac{C_A}{C}\sum n_{i,y}$	$n_{A,z} = -\mathscr{D}_{AB}\frac{\partial C_A}{\partial z} + \frac{C_A}{C}\sum n_{i,z}$

Coordenadas Cilíndricas

$n_{A,r} = -\mathscr{D}_{AB}\frac{\partial C_A}{\partial r} + \frac{C_A}{C}\sum n_{i,r}$	$n_{A,\theta} = \frac{-\mathscr{D}_{AB}}{r}\frac{\partial C_A}{\partial \theta} + \frac{C_A}{C}\sum n_{i,\theta}$	$n_{A,z} = -\mathscr{D}_{AB}\frac{\partial C_A}{\partial z} + \frac{C_A}{C}\sum n_{i,z}$

Coordenadas Esféricas

$n_{A,r} = -\mathscr{D}_{AB}\frac{\partial C_A}{\partial r} + \frac{C_A}{C}\sum n_{i,r}$	$n_{A,\theta} = \frac{-\mathscr{D}_{AB}}{r}\frac{\partial C_A}{\partial \theta} + \frac{C_A}{C}\sum n_{i,\theta}$	$n_{A,\phi} = \frac{-\mathscr{D}_{AB}}{r\,\mathrm{sen}\,\theta}\frac{\partial C_A}{\partial \phi} + \frac{C_A}{C}\sum n_{i,\phi}$

NOTACIÓN:

$\mathbf{n}_A$ =densidad de flujo molar total de A (kmols/m²·s)

$\mathscr{D}_{AB}$ = difusividad de A en B (m²/s)

C_A = concentración molar de A (kmol/m³)

∇C_A = gradiente de concentración de A (kmol/m⁴)

C = concentración molar total (kmol/m³)

$\sum \mathbf{n}_i$ = suma de las densidades de flujo molar total de todos los componentes (kmol/m²·s)

(para sistema binario $\sum \mathbf{n}_i = \mathbf{n}_A + \mathbf{n}_B$)