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$$c = \rho q = \rho K_0 \exp(\frac{\Delta H_a}{RT})P \qquad ()$$

$$J_{s} = -\rho \varepsilon D_{0}(q) K_{0} \exp(\frac{\Delta H_{a}}{RT}) \exp(\frac{-\Delta E}{RT}) \frac{dp}{dz} \quad ()$$

$$Q_s = Q_0 \exp\left(\frac{\Delta H_a - \Delta E}{RT}\right) \tag{()}$$

$$Q_0 = \frac{\rho \varepsilon D_0(q) K_0}{L} \tag{()}$$

 $D^e_{ij} \quad D^e_{K,i}$

 $\frac{8RT}{\pi M_{i}}$

i

 $-\frac{P}{RT}\nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P = \int_{X_{k,i}}^{X_{k,i}} \nabla x_i - \frac{x_i}{RT}(1 + \frac{B_0^e}{D_{k,i}^e \eta}P)\nabla P$

 $D_{ij}^{e} = \frac{\varepsilon}{\tau} D_{ij}$, $D_{K,i}^{e} = \frac{4}{3} K$

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$$D_{kn} = \left(\frac{\varepsilon.d_p}{3\tau}\right) \left(\frac{8RT}{\pi M}\right)^{1/2}$$
()

:

$$(J = -D_{(C)}.\nabla C)$$

$$J_{kn} = \frac{-2}{3} \cdot \frac{\mathscr{E}r_p}{\tau} \left(\frac{8}{\pi RTM}\right)^{0.5} \frac{dp}{dz} \tag{)}$$

$$Q_{kn} = \frac{J_{kn}}{\Delta P} = \frac{2\varepsilon r_p}{3\tau L} \left(\frac{8}{\pi RTM}\right)^{1/2}$$
()

$$Q(MT)^{1/2}$$

rp

= 1, *n*

()

()

 $D_{K_{i}}^{e}$

$$\epsilon/\tau$$
 K_{o}^{e} B_{o}^{e} $b = b_{0} \exp(\frac{\Delta H_{a}}{RT})$ ()

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(bP<<1)

$$q = q_s bp = KP = K_0 \exp(\frac{\Delta H_a}{RT})P \qquad ()$$

$$J_{i} = -\frac{1}{RT} \left(\frac{4}{3} K_{0}^{e} \sqrt{\frac{8RT}{\pi M_{i}}} + \frac{B_{0}^{e}}{\eta_{i}} P \right) \nabla P \qquad ()$$

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 $H_2/CO_2 = H_2/CH_4 =)$ () (CO₂/CH₄ = . . ()

بحث و نتیجه گیری

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	(m^2g^{-1})	$(cm^{3}g^{-1})$	(nm)
J	3	/	1

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- 1 Lin, Y. S. (2001). "Microporous and dense inorganic membranes: current status and prospective." *Separation and Purification Technology*, Vol. 25, PP. 39-55.
- 2 Caro, J., Noack, M., Koelsch, P. and Schaefer, R. (2000). "Zeolite membranes- state of their development and perspective." *Microporous and Mesoporous Material*, Vol. 38, PP. 3-24.
- 3 Xomeritakis, G., Naik, S., Braunbarth, C. M., Cornelius, C. J., Pardey, R. and Brinker, C. J. (2003). "Organic-templated silica membranes I. Gas and vapor transport properties." *J. of Membrane Science*, Vol. 215, PP. 225-233.
- 4 Uhlhorn, R. J. R., Huis, M. B., Keizer, K. and Burggraaf, A. J. (1992). "Synthesis of ceramic membranes, Part I: synthesis of non-supported and supported γ- Alumina membranes without defect." J. of Material Science, Vol. 27, PP. 527.
- 5 Brinker, C. J., Ward, T. L., Sehgal, R., Raman, N. K., Hietala, S. L., Smith, D. M., Hua, D. W. and Headley, T. J. (1993). "Ultramicroporous silica based supported inorganic membrane." *J. of Membrane Science*, Vol. 77, PP. 165-179.

- 6 Brinker, C. J., Sehgal, R., Hietala, S. L., Deshpande, R., Smith, D. M., Loy, D. and Ashley, C. S. (1994). "Sol-gel strategies for controlled porosity inorganic materials." *J. of Membrane Science*, Vol. 94, PP. 85-102.
- 7 Zhong, S. H., Li, C. F. and Li, Q. (2003). "Supported mesoporous SiO2 membranes by sol-gel-template technology." *Separation and Purification Technology*, Vol. 32, PP. 17-22.
- 8 McCool, B. A., Hill, N., Dicarlo, J. and DeSisto, W. J. (2003). "Synthesis and characterization of mesoporous silica membranes via dip-coating and hydrothermal deposition techniques." *J. of Membrane Science*, Vol. 218, PP. 55-67.
- 9 Schubert, U. and Husing, N. (2005). Synthesis of inorganic materials. 2nd Ed., Wiley-VCH, Weineheim.
- 10 Kresge, C. T., Leonowicz, M. E., Roth, W. J., Vartuli, J. C. and Beck, J. S. (1992). "Ordered mesoporous molecular sieves synthesized by a liquid-crystal template mechanism." *Nature*, Vol. 359, PP. 710-712.
- 11 De Vos, R. M. and Verweij H. (1998). "Improving performance of silica membrane for gas separation." J. of Membrane Science, Vol. 143, PP. 37-51.
- 12 Tsai, C. Y., Tam, S. Y., Lu, Y. and Brinker, C. J. (2000). "Dual-layer asymmetric microporous silica membrane." *J. of Membrane Science*, Vol. 169, PP. 255-268.
- 13 Thomas, S., Schafer, R., Caro, J. and Morgenstern, A. S. (2001). "Investigation of mass transfer through inorganic membrane with several layers." *Catalysis Today*, Vol. 67, PP. 205-216.
- 14 Lee, D. and Oyama, S. T. (2002). "Gas permeation characteristics of a hydrogen selective supported silica membrane." J. of Membrane Science, Vol. 210, PP. 291-306.
- 15 Burggraaf, A. J. and Cot, L. (1996). Fundamentals of inorganic membrane science and technology. Elsevier science.
- 16 Langmuir, I. (1915). "Chemical reaction at low pressures." *J. of American Chemical Society*, Vol. 37, PP. 1139.
- 17 Atkin, R., Craig, V. S. J., Wanless, E. J. and Biggs, S. (2003). "Mechanism of cationic surfactant adsorption at the solid–aqueous interface." *Advanced Colloid Interface Science*, Vol. 103, No. 3, PP. 219-304.
- 18 Pakizeh, M. Omidkhah, M. R. and Zaringhalam, A. (2007). "Synthesis and characterization of new silica membranes using template –sol –gel technology." *International Journal of Hydrogen Energy*, Vol. 32, No. 12, PP. 1825-1836.
- 19 Pakizeh, M. Omidkhah, M. R. and Zaringhalam, A. (2007). "Study of mass transfer through new templated silica membranes prepared by sol-gel method." *International Journal of Hydrogen Energy*, Vol. 32, No. 12, PP. 2032-2042.
- 20 So, J. H. and Yang, S. M. (1998), "Preparation of silica-alumina composite membranes for hydrogen separation by multi-step pore modification." *J. of Membrane Science*, Vol. 147, PP. 147-158.
- 21 Kusakabe, K., Li, Z. Y., Maeda, H. and Morooka, S. (1995). "Preparation of supported composite membrane by pyrolysis of polycarbosilan for gas separation at high temperature." *J. Membrane Science*, Vol 103, PP. 175-180.
- 22 Li, Z. Y., Kusakabe, K. and Morooka, S. (1996). "Preparation of thermo stable amorphous Si---C---O membrane and its application to gas separation at elevated temperature." *J. Membrane Science*, Vol. 118, PP. 159-168.

واژه های انگلیسی به ترتیب استفاده در متن

- 1 Template
- 3 Viscous flow model
- 5 Surface diffusion model
- 7 Configurational diffusion model
- 9 Critical micellar concentration
- 11 Brunaver-Emmett-Teller
- 13 Permeation

- 2 Template thechniqe
- 4 Knudsen diffusion model
- 6 Dusty gas model
- 8 Gas translational diffusion model
- 10 Membrane Characterization
- 12 Pore
- 14 Permselectivity