
علی اصغر حمیدی^{۱*} و آزاده امراللهی^۲

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$$\alpha = \frac{A.r^2}{4(T_a - T_0)}$$

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(CMC)

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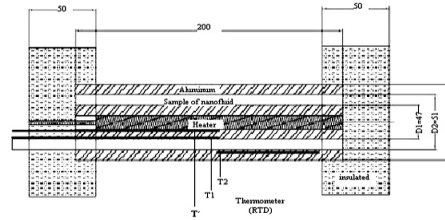
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$$k_m = Q \frac{\ln(R_2 / R_1)}{2l\pi(T_1 - T_2)} \quad ()$$

B

[-]



$$\theta(r, t) = BV(\alpha, r) \cdot \exp(-k\alpha^2 t / \rho c_p) \quad ()$$

$$B = \frac{\rho' c'_p \int_{R_1}^{R_2} \bar{\theta}(r, 0) \bar{V}(\alpha, r) r dr + \rho c_p \int_{R_1}^{R_2} \theta(r, 0) V(\alpha, r) r dr}{\rho' c'_p \int_{R_1}^{R_2} \bar{V}^2(\alpha, r) r dr + \rho c_p \int_{R_1}^{R_2} V^2(\alpha, r) r dr}$$

ρc_p

$$\Delta T(t) - \Delta T(\infty) = \theta(R, t)$$

$$\theta(R, t) = \frac{\dot{Q}}{\sqrt{k\pi}} \sum_{\alpha} \psi [V(\alpha, R)] \exp(-k\alpha^2 t / \rho c_p)$$

$$\ln \theta(R, t) = \ln \frac{\dot{Q}}{2k\pi} \sum_{\alpha} \psi [V(\alpha, R)] \exp(-k\alpha^2 t / \rho c_p) \quad ()$$

$\ln(\theta)$

$$P_m = \frac{k\alpha^2}{\rho c_p} \quad ()$$

$$D_1(\alpha) = \frac{R_1 P_m \rho' c'_p}{\sqrt{k}}$$

$$D_2(\alpha) = \alpha \frac{H_{11}(\alpha R_1, \alpha R_2)}{H_{11}(\alpha R_1, \alpha R_2)} \quad ()$$

$$H_{10}(p, q) = J_1(p) \cdot Y_0(q) - J_0(q) \cdot Y_1(p)$$

$$H_{00}(p, q) = J_0(p) \cdot Y_0(q) - J_0(q) \cdot Y_0(p)$$

BSEN60751-1996

TAP50407

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K=

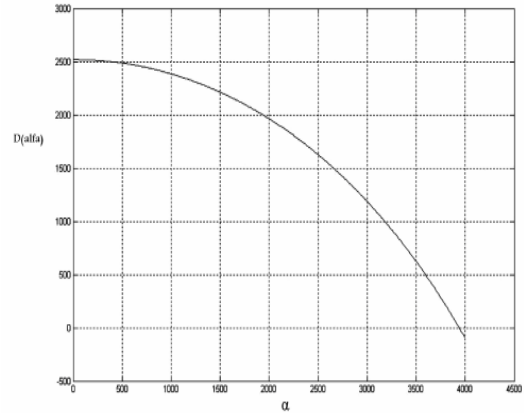
$P_m \propto k$

[-]

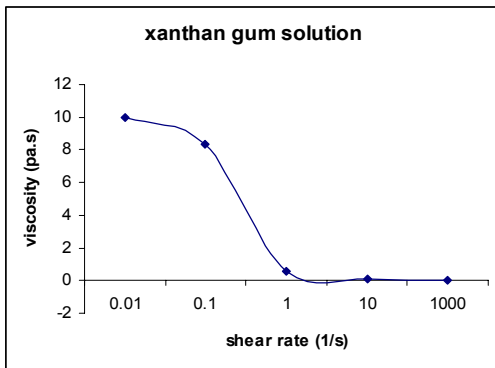
H, Y, J

() α D

$$D_1 = \frac{J_1(\alpha.R_1)Y_0(\alpha.R_2) - J_0(\alpha.R_2)Y_1(\alpha.R_1)}{J_0(\alpha.R_1)Y_0(\alpha.R_2) - J_0(\alpha.R_2)Y_0(\alpha.R_1)} \alpha \quad ()$$



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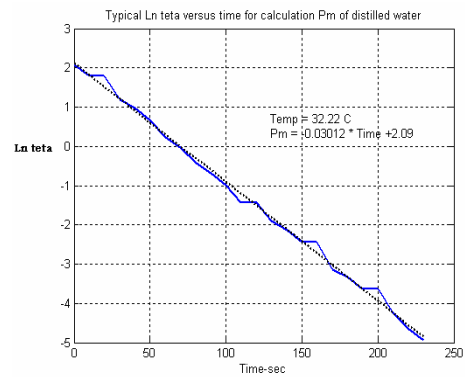
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P_m

P_m

()



P_m

P_m

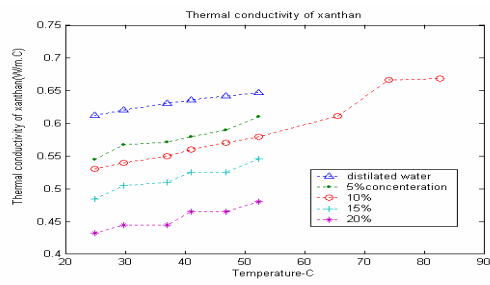
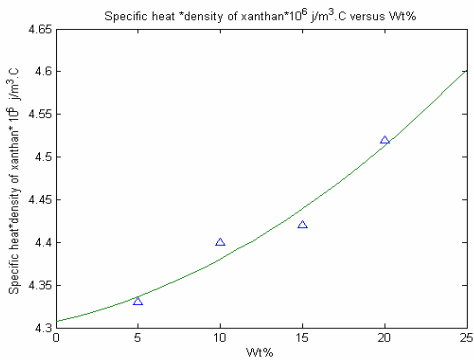
D

() ()

$\alpha, ()$

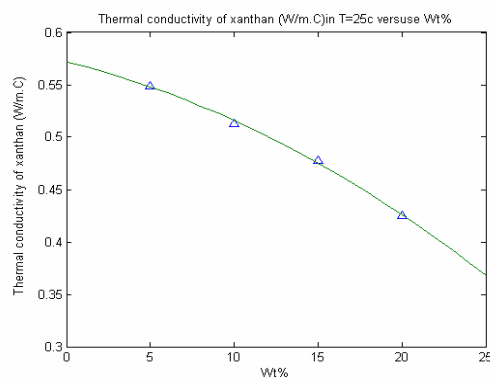
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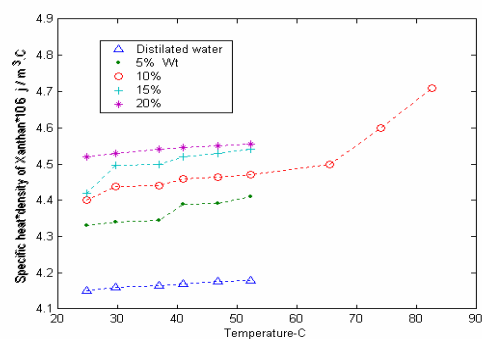


CMC

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CMC



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$$\frac{K_{Xanthan}}{K_{water}}(T, C) = 0.77 T^{0.109} C^{-0.142} \begin{cases} 0 \leq C \leq 20 \\ 20 \leq T \leq 55 \text{ } ^\circ\text{C} \end{cases} \quad ()$$

$$r^2 = 0.956$$

$$\frac{\rho c_p Xanthan}{\rho c_p water}(T, C) = 0.36 T^{0.089} C^{0.28} \begin{cases} 0 \leq C \leq 20 \\ 25 \leq T \leq 60 \text{ } ^\circ\text{C} \end{cases} \quad ()$$

$$r^2 = 0.893$$

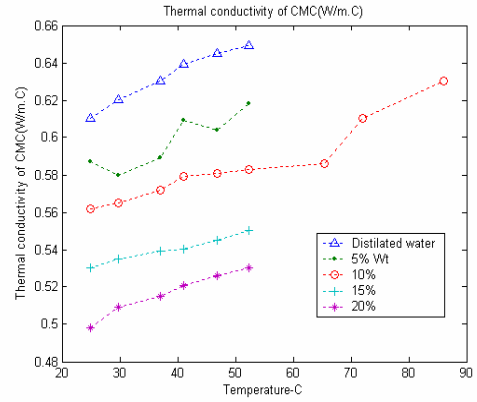
CMC

$$\frac{K_{CMC}}{K_{water}}(T, C) = 0.791 T^{0.15} C^{-0.147} \begin{cases} 0 \leq C \leq 20 \\ 20 \leq T \leq 55 \text{ } ^\circ\text{C} \end{cases} \quad ()$$

$$r^2 = 0.926$$

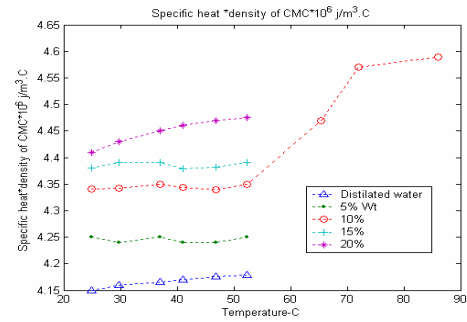
$$\frac{\rho c_p CMC}{\rho c_p water}(T, C) = 0.33 T^{0.091} C^{0.29} \begin{cases} 0 \leq C \leq 20 \\ 25 \leq T \leq 60 \text{ } ^\circ\text{C} \end{cases} \quad ()$$

$$r^2 = 0.913$$



CMC

CMC



CMC

CMC

(K/s)

: A

: B

: C

: D

(J/ kg.K)

: C_p

	(m)	: $R_{1,2}$	(J/kg.K)	: C_p
(c)		: $T_{1,2}$	(K)	: T_a
		: V	(K)	: T_0
	(m^2/s)	: α	(W/m.K)	: K_m
	(kg/m^3)	: ρ_f'		: P_m
	(kg/m^3)	: ρ_f	(W/m)	: Q^*
		: θ	(m)	: r

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