

\*

( / / : - / / : )

/

(*EF*)

(*RMSE*)

( $\chi^2$ )

(Ratti & Mujumdar, 1997)

(Anon., 2006)

Sacilik & )

Kingsly & Singh, ) (Elicin, 2006; Wang et al, 2007

(Togrul & Pehlivan, 2002, 2003) (2007

Dandamrongrak et ) (Hamdy & El-Ghetany, 2006)

Kashaninejad et al., 2007; Midilli & ) (al., 2002

Goyal et ) (Akpınar, 2003) (Kucuk, 2003

(al., 2007; Menges & Ertekin, 2006

(Yaldız & Ertekin, 2001)

Doymaz, 2006, Doymaz, 2007a, Doymaz, )

Doymaz, 2007; Erenturk & Erenturk, ) (2007b

(2007

( ) TESTO 405-V1  
 / m/s  
 ( )

Cihan et al., 2007; Doymaz, 2007; Erenturk & )  
 Erenturk, 2007; Giri & Prasad, 2007; Goyal et al., 2007;  
 Kashaninejad et al., 2007; Kingsly & Singh, 2007;  
 (Sacilik & Elicin, 2006; Wang et al., 2007

)  
 ( × cm<sup>2</sup>

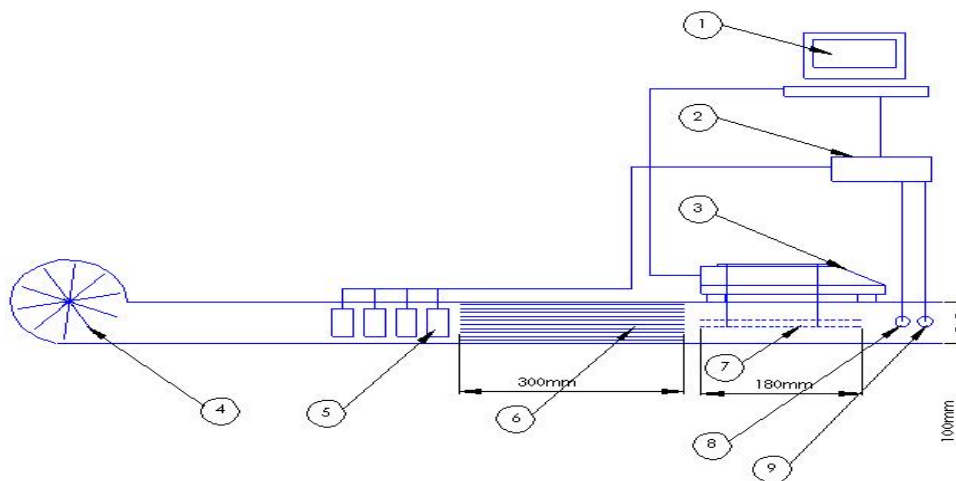
( )

°C ( ) (LM35)  
 / m/s

) / /  
 ( / /

Zhang & ) °C

(Litchfield, 1991



$$\chi^2 = \frac{\sum_{i=1}^n (MR_{exp,i} - MR_{pre,i})^2}{N - n} \quad (۳)$$

$$RMSE = \left[ \frac{1}{N} \sum_{i=1}^n (MR_{pre,i} - MR_{exp,i})^2 \right]^{1/2} \quad (۴)$$

$$EF = \frac{\sum_{i=1}^N (MR_{i,exp} - MR_{i,exp_{mean}})^2 - \sum_{i=1}^N (MR_{i,pre} - MR_{i,exp})^2}{\sum_{i=1}^N (MR_{i,exp} - MR_{i,exp_{mean}})^2} \quad (۵)$$

( )

( ) ( )

$$MR = \frac{M - M_e}{M_0 - M_e} \quad (۱)$$

$$MR = \frac{M}{M_0} \quad (۲)$$

i  $M_{exp,i}$

$M_{pre,i}$

n ( )

N

i

: M

: MR

:  $M_0$

:  $M_e$

(Doymaz, 2007a; Goyal et al., 2007)

Akpınar et al., 2003; )

Cihan et al., 2007; Midili & Kucuk, 2003; Togrul &

(Pehlivan, 2002; Togrul & Pehlivan, 2003

( )

(MR)

(Guarte, 1996)

Linear  $Y = a + bX$  (۶)

Logarithmic  $Y = a + \ln(X)$  (۷)

Power  $Y = aX^b$  (۸)

Exponential  $Y = a \exp(bX)$  (۹)

Arrhenius  $Y = a \exp(b/X)$  (۱۰)

SPSS 14

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Westerman et al., 1973  $MR = \exp(-kt)$

Guarte, 1996  $MR = \exp(-kt^n)$

Yaldiz et al., 2001  $MR = \exp[-(kt)^n]$

Zhang & Litchfield, 1991  $MR = a \exp(-kt)$

Yaldiz & Ertekin, 2001  $MR = a \exp(-kt) + c$

Rahman et al., 1998  $MR = a \exp(-k_0t) + b \exp(-k_1t)$

Verma et al., 1985  $MR = a \exp(kt) + b \exp(gt) + c \exp(ht)$

Ertekin & Yaldiz, 2004  $MR = \exp(-kt)$

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k g h c b a (min) t (d.b.) :MR #

m

( $\chi^2$ )

(EF)

(RMSE)

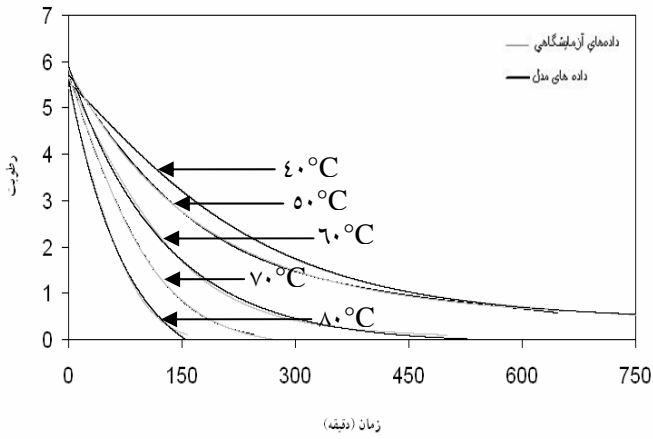
$\chi^2$  EF

( )

RMSE

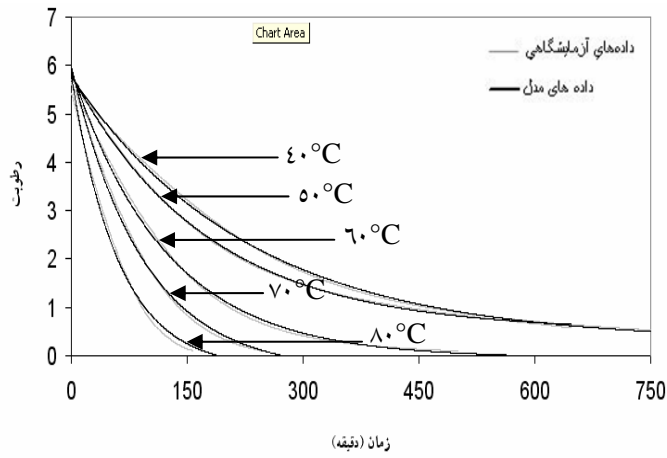
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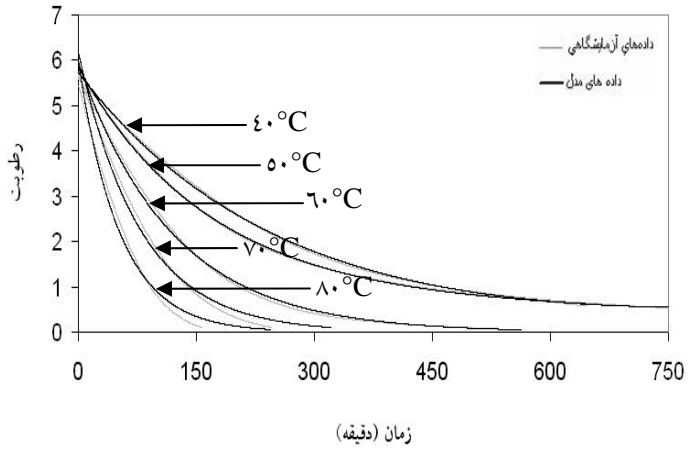
زمان (دقیقه)

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زمان (دقیقه)

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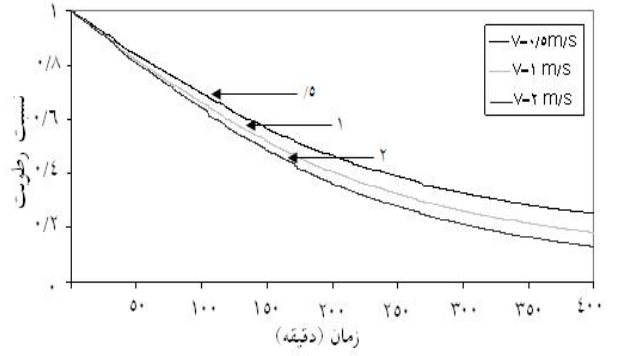
زمان (دقیقه)

RMSE  $\chi^2$  EF

( )

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(Guarte, 1996; Yıldız & Ertekin, 2001)



°C

( )

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°C

°C °C

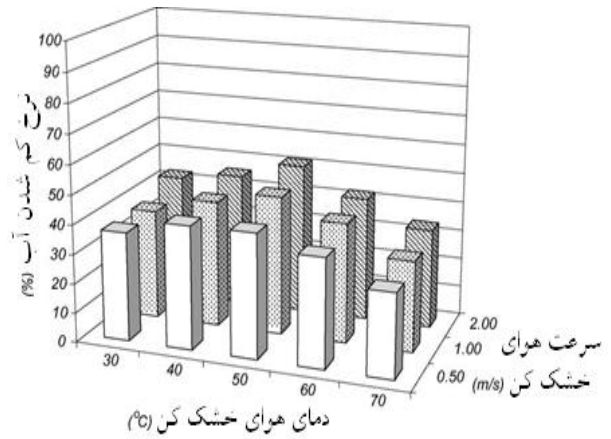
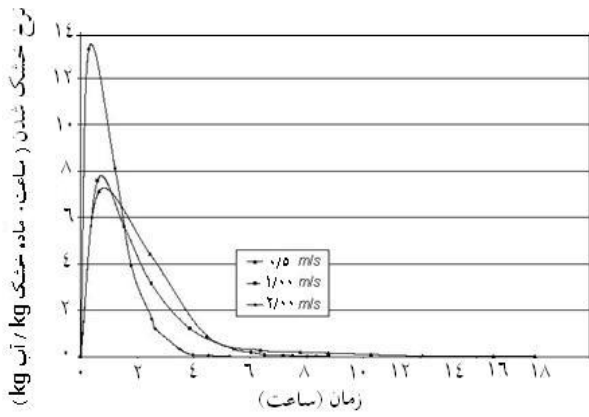
% / % /  
°C

( )

( )

°C

(Yaldiz et al., 2001)



°C

( )

$\chi^2$	EF	RMSE	b (h <sup>-1</sup> )	n	k (h <sup>-1</sup> )	a	(m/s)	(°C)
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
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/	/	/	/	/	/	/	/	/

$$\frac{M}{M_0} = a \exp(-kt^n) + bt$$

b	$\chi^2$	RMSE	EF	$\chi^2$	RMSE
b	/	/	/	/	/
( )	( )	( )	( )	( )	( )
$\chi^2$	/	/	/	/	/
/	/	/	/	/	/

$$MR = (c + dT) \exp[(e + fT)t^{(g+hT)}] + (i + jT + lT^2 + mV)t$$

		( )				
	$\chi^2$	RMSE	EF			
				(m/s)	(°C)	
/		°C		/	/	
			m/s	/	/	
				/	/	
				/	/	
				/	/	
				/	/	
				/	/	
				/	/	
				/	/	
			a, b, n, k	/	/	
			EF	/	/	
			M	/	/	
d.b.			$M_0$	g= /	f= /	
kg water/kg dry matter			$M_e$	e= /	d= /	
kg water/kg dry matter			MR	l= /	j= /	
					i= /	
					h= /	
					m= /	
			$MR_{exp;i}$			
			$MR_{exp;mean}$			
			$MR_{pre;i}$			
			N			
			n			
			RMSE			
°C			T	°C	( )	
s			t			
			$\chi^2 - square$			

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