

() , ()

(RSM)

*

(// : // :)

(°C) (/ %) ()
(/

/

($p < /$)

(ANOVA)

/ °C
(/) / WL % /
/ a_w (/) / WR (

(Shi et al., 2003)

(*Daucus carota L.*)

B₁₂ B₆ B₂ B₁

(Saurel et al., 1994; Krokida et al.,

2001)

(Gupta et al., 2007)

a_w

:

RSM .

(Box & Draper,
1987; Myers et al., 1996; Khuri & Cornell, 1996; Eren &
Kaymak- Ertekin, 2006)

/

a_w (WR)

SG WL

(Ponting,

WR WL

1973; Khin et al., 2006)

a_w SG

(Lenart & Flink, 1984;

Tahmasbi et al., 2006)

)

(

°C

(Gupta et al., 2007)

× ×

(Ponting, 1973)

)

(

(

)

(Araujo & Murr, 2002)

(SG)

(WL)

()

(RSM)

()

(Ravindra &
Chattopadhyay, 2000; Madamba & Lopez, 2002;
Riberio et al., 2002; Corzo & Gomez, 2004)

°C

RSM .

(Tahmasbi et al., rpm .2006)

aw WR SG WL
 (x_3) (x_2) (x_1)
 (x_4)

(CCRD)

(Bao & Chang, .1994)

$(\lambda = 2)$ (n_0)
 $($
 $)$

CCRD

(Y_k)
 (x_i) aw WR SG WL

(AOAC, (aw) .1980)

$$Y_k = \beta_{k0} + \sum_{i=1}^4 \beta_{ki} x_i + \sum_{i=1}^4 \beta_{kii} x_i^2 + \sum_{i=1}^4 \sum_{j=i+1}^4 \beta_{kij} x_i x_j \quad ()$$

(Novasina TH-500) aw °C ± /

(k=)

$$\beta_{kij} \beta_{ki} \beta_{kii} \beta_{k0}$$

x

WR SG WL

(ANOVA)

F

$$\frac{m_i s_i - m_f s_f}{m_i} WL = \times 100 \quad \frac{P_f}{100 \text{ گرم نمونه تا ۱۰۰}} \quad ()$$

R² R²

R²

$$\frac{m_f s_f - m_i s_i}{m_i} SG = \times 100 \quad \frac{P_f}{100 \text{ گرم نمونه تا ۱۰۰}} \quad ()$$

R²

(PRESS)

PRESS

$$WR = WL - SG \quad \frac{P_f}{100 \text{ گرم نمونه تا ۱۰۰}} \quad ()$$

R²

m_f m_i

Z_f Z_i ()

S_f S_i (/)

(/)

(Eren & Kaymak- Ertekin, 2006)

2. Central Composite Rotatable Design
3. Run
4. Lack of Fit
5. Curvature of the Model
6. Interaction Terms
7. Adequacy
8. Adjusted -R2
9. Predicted -R2
10. Prediction error sum of squares

1. Randomized

()

T_i $s >$ $s <$ R^2 $adj-R^2$

$$d_i(\hat{y}_i) = \begin{cases} 0 & \hat{y}_i(x) < L_i \\ \left(\frac{\hat{y}_i(x) - L_i}{T_i - L_i}\right)^s & L_i \leq \hat{y}_i(x) \leq T_i \\ 1 & \hat{y}_i(x) > T_i \end{cases}$$

() (Myers & Montgomery, 1995)

T_i

$$d_i(\hat{y}_i) = \begin{cases} 1 & \hat{y}_i(x) < T_i \\ \left(\frac{\hat{y}_i(x) - U_i}{T_i - U_i}\right)^s & T_i \leq \hat{y}_i(x) \leq U_i \\ 0 & \hat{y}_i(x) > U_i \end{cases}$$

()

Minitab Version 6

D

()

$$D = (d_1^{v_1} \times d_2^{v_2} \times d_3^{v_3} \times \dots \times d_n^{v_n})^{1/\sum v_i}$$

$$= \left(\prod_{i=1}^n d_i^{v_i}\right)^{1/\sum v_i}$$

v_i

() :

()

()

(aw)

(Harrington, 1965)

WR WL

aw SG

x

d_i

Y_i

(Derringer & Suich,

(Y_i)

T_i U_i L_i .1980)

()

Y_i

$p < l$

s

$s =$

() aw WR SG WL

1. Contour
2. Measurement

... :

()

adj-R² R²

(CV)

SOP

()

(p > /)

% / aw WR SG WL

% / % / % /

R² R² PRESS

%

R² (CV) R² R²

PRESS (R² > /)

(Eren

.& Kaymak- Ertekin, 2006)

1. Lack of fit

(Coef.)				ANOVA				
Aw		WR (%)		SG (%)		WL (%)		
p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	
< /	/	< /	/	< /	/	< /	/	
< /	/	< /	/	< /	/	< /	/	X ₁
/	/	/	/	/	/	/	/	X ₂
< /	/	< /	/	< /	/	< /	/	X ₃
< /	/	< /	/	/	/	< /	/	X ₄
/	/	/	/	/	/	/	/	X ₁₂
/	/	/	/	/	/	/	/	X ₂₂
/	/	/	/	/	/	/	/	X ₃₂
/	/	/	/	/	/	/	/	X ₄₂
/	/	/	/	/	/	/	/	X _{1X₂}
/	/	/	/	/	/	/	/	X _{1X₃}
/	/	/	/	/	/	/	/	X _{1X₄}
/	/	/	/	/	/	/	/	X _{2X₃}
/	/	/	/	/	/	/	/	X _{2X₄}
/	/	/	/	/	/	/	/	X _{3X₄}
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	R ²
/	/	/	/	/	/	/	/	Adj-R ²
/	/	/	/	/	/	/	/	CV

SG

()

(c b a)

SG

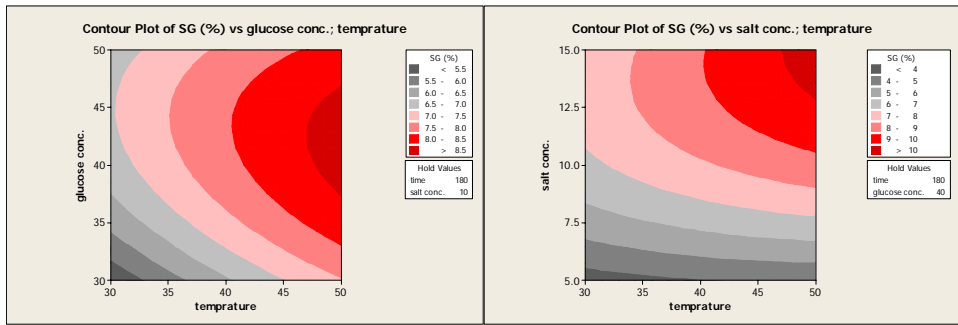
()

(c b a)

(d) SG

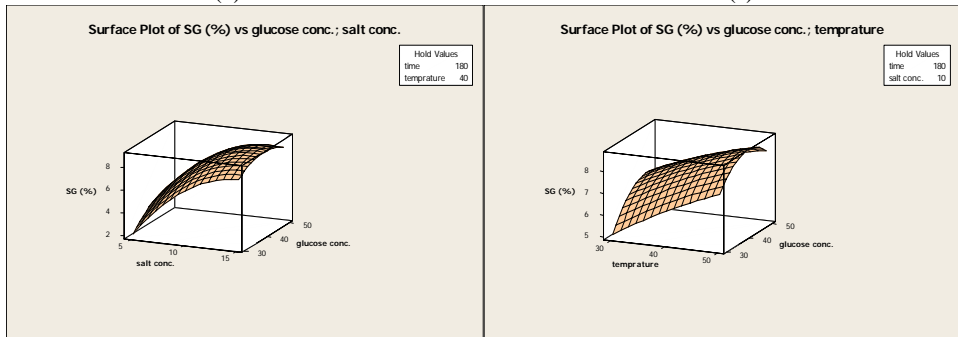
d

, ()



(b)

(a)



(d)

(c)

SG

-

WL

WR

SG

SG

WL (

(Torreggiani, 1993)

WL

WL

SG

(a)

(a)

(WR)

SG

WL

(Madamba & Lopez, 2002)

(Lazarides et al.,

1995; Lewicki & Lenart, 1995; Ertekin et al., 1996;

Genina-Soto et al., 2001)

SG

WL

()

(c b)

()

WL

WL

SG

°C)

SG

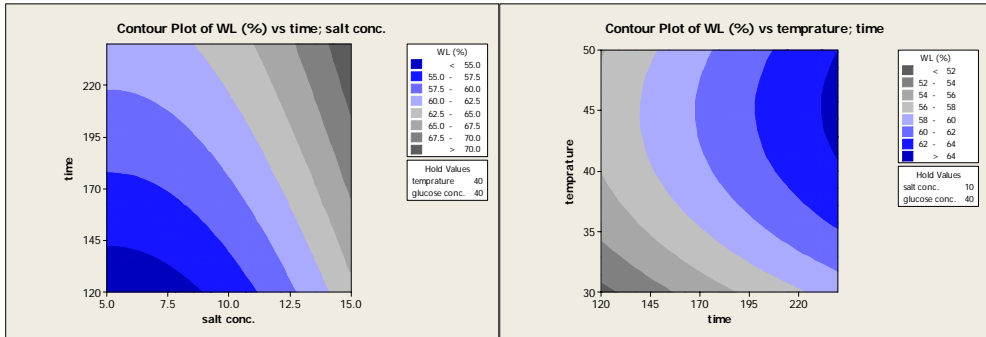
(Chenlo et al., 2002;

WR WL (

() d

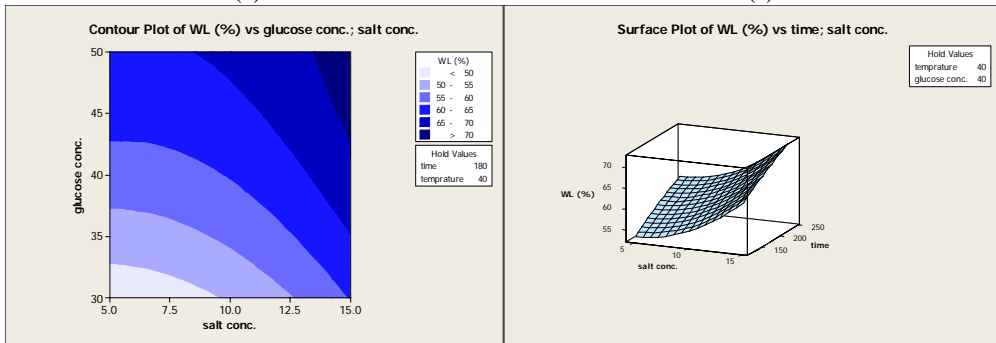
Moreira et al., 2003)

WL



(b)

(a)

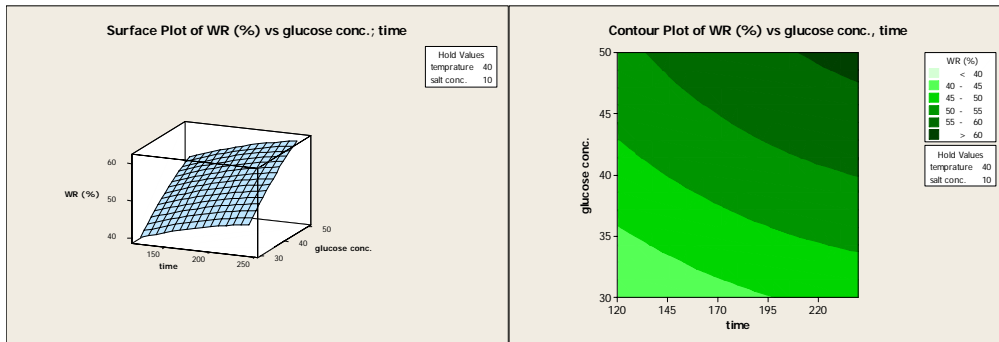


(d)

(c)

WL

-

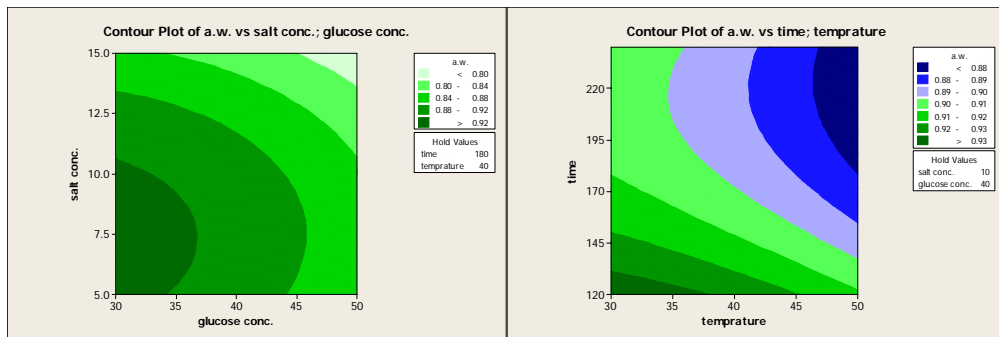


(b)

(a)

WR

-



(b)

(a)

aw

-

°C

SG WL

% %

()

aw WR

/ °C / °C
 / % /
 / %

(a)

WR SG WL

aw SG

/) / aw WR SG WL
 (/) / (/) /
 / (/) /
 /

(b)

(Collignan et al., 1994; Giempero et al., 2001;
 Sacchetti et al., 2001; Sereno et al., 2001)

aw SG WR WL

WL

WR SG WL)

(aw

SG

aw WR SG WL
 / °C
 / WL % /
 /) / SG (/)
 (/) / WR (/)
 % / aw
 ()

WL

aw SG WR WL

aw SG WR WL

/

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