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(II)

($R^2 > /$)

%

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($R^2 > /$)

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(II)

(q_m)

($R^2 > /$)

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(II)

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(II)

Aksu)

(2002; Eckenfelder 2000

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(Sternberg and Dorn 2002; Volesky 2001)

(II)	(Durvillaea potatorum)	(Biosorption)
/ /	(Ecklonia radiata)	Dönmez et al. 1999; Figueira et al. 2000;)
(II)	.	.(Loukidou et al. 2003
(Streptomyces rimosus)	/	
Selatnia))	()
(II)	.(et al. 2004	(... (Davis et al. 2003)
(II)	(II)	:
		(Biosorbent)
		Diniz and Volesky)
		.(2005; Ma and Tobin 2003
		(II) (II)
/ /		(II)
	%	(Aspergillus oryzae)
	Kiff and Little)	
/	(;1986
		(II)
		(Rhizopus nigricans)
		(II)
	Benguella and Benaissa)	
KCl NaCl Cd(NO ₃) ₂ .2H ₂ O Pb(NO ₃) ₂	(; 2002

() CaCl₂.2H₂O MgCl₂.6H₂O
 pH . (Merck
 pH /
 :) /
 (Mixed cellulose ester) / μm CAMLAB) pH (Merck
 ((II) (II)) (Ltd, Model CG842

FAAS, Chem. Tech Analytical, Model))
 (ALPHA4 AZTEC ENVIRONMENTAL)
 “Standard Methods for B (CONTROL Ltd
 the Examination of Water and Wastewater”
 .(APAH, AWWA and WEF 1998)

: (±)
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() () (Langergren) (II) (II)
) () (Mixed-order)

$$\ln \frac{(q_e - q)}{q_e} = -k_1 t$$

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e} t$$

$$\frac{1}{t} \ln \frac{C_0}{C_t} = -\frac{k_0}{K} - \frac{1}{K} \left(\frac{C_0 - C_t}{t} \right)$$

$$\frac{1}{(q_e - q_t)} = \frac{1}{q_e} + kt$$

:q_e q () :t pH . / pH

) :k₁ (

) :k₂ (

:C_t C₀ (

() k₀ () t

:k : () K (II)

() (II)

Azizian 2004; Benguella and)

.(Benaissa 2002; Metcalf and Eddy Inc 2003 pH . / (II) (II)

$$n \quad q_m \quad b \quad : \quad (II) \quad (II)$$

(Volesky 2003)

$$q_e = \frac{K_{RP} C_e}{1 + a_{RP} C_e^\beta} \quad ()$$

) a_{RP} () K_{RP}
() β (β)
(Aksu 2002; Volesky 2003)

$$(II) \quad (II) \quad :$$

$$(II) \quad (II)$$

$$q_e = \frac{b q_m C_e}{1 + b C_e}$$

$$(II) \quad (II) \quad) \quad : C_e$$

() q_m ()
() b ()
Sheng et al. 2004; Yalçınkaya et al.)

(2002

$$(II) \quad (II)$$

$$(II) \quad (II) \quad q_e = K_F C_e^{1/n} \quad ()$$

$n \quad K_F$

$$(II) \quad (q_m) \quad (II)$$

Loukidou et al.)

(. 2004, Selatnia et al. 2004b

$$(II) \quad (II)$$

$$q_e = \frac{b q_m C_e^{1/n}}{1 + b C_e^{1/n}} \quad ()$$

% %

(Yan and Viraraghavan 2003)

(k₂)
/ : (II)
/ / /

(k₀)
/ : (II) (Ascophyllum nodosum)
/ / / Kuyucak)
(; and Volesky 1989

(II) (k₂) (II)
/ / / % %

(II) (k₀) (III)
/ / / %
(II) (II) (II) (II)
(II) (II) (II) Matheickal and) %
(II) (II) (II) (Yu 1999

(II) (II) pH (R²> /) (II) (II)
pH (II) pH (II) (II)
(II) pH (II) (II)
pH (II) pH (II) Aeromonas) (VI)
pH / / / / (caviae)
/ (II) / / /

pH (II) (II) (II)
Mucor) (II)
(rouxii

Diniz and) .

(II) (II) (III) (III) (III) (Volesky 2005

() (Oscillatoria anguistissima)
(Ahuja et al. 1999)

(II)

pH (II) Aksu) (II) (II) (2002
(R² > /)

(II) (II) (q_m) (R² > /)

(II) (II)

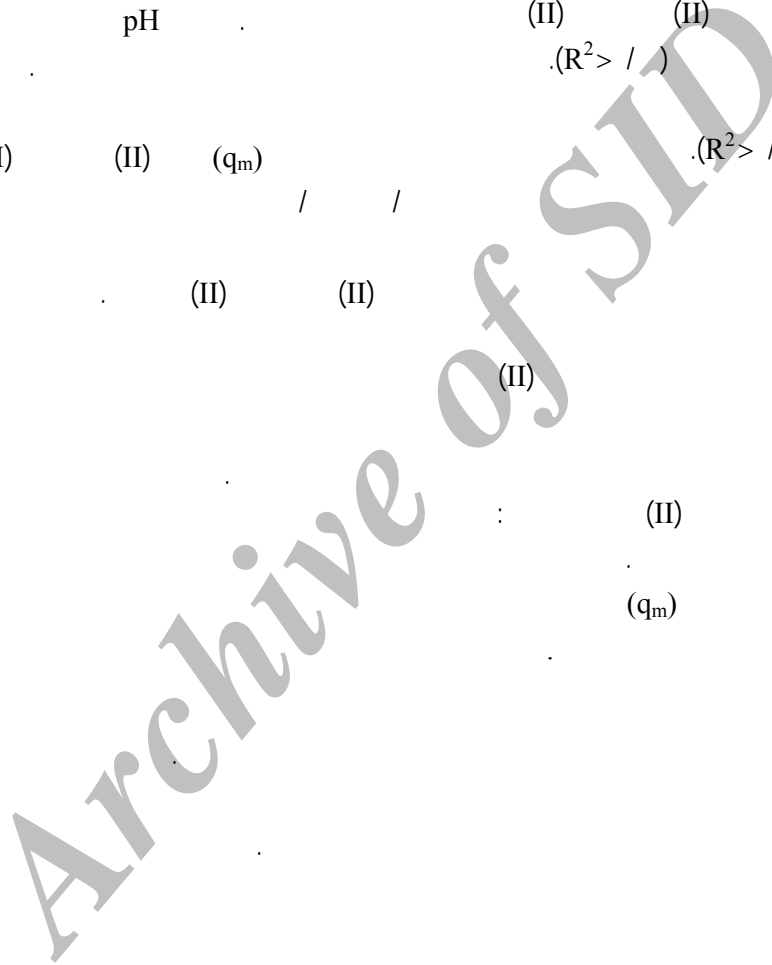
(II)

(II)

(II) (II) (q_m) / /
(q_m)

(Volesky 2001)

(... pH)



/ ... (II) (II)

Cd²⁺ Pb²⁺

Saturation

R ²	k (gmmol ⁻¹ min ⁻¹)	q _e (mmolg ⁻¹)	R ²	k ₀ (mMmin ⁻¹)	K (Mm)	R ²	k ₂ (gmmol ⁻¹ min ⁻¹)	q _e (mmolg ⁻¹)	R ^{2*}	k ₁ (min ⁻¹)	q _e (mmolg ⁻¹)	(Mm)	
/	/	/	/	/	/	/	/	/	/	/	/		Pb ²⁺
/	/	/	/	/	/	/	/	/	/	/	/		Pb ²⁺
/	/	/	/	/	/	/	/	/	/	/	/	/	Pb ²⁺
/	/	/	/	/	/	/	/	/	/	/	/		Cd ²⁺
/	/	/	/	/	/	/	/	/	/	/	/		Cd ²⁺
/	/	/	/	/	/	/	/	/	/	/	/	/	Cd ²⁺

:R*

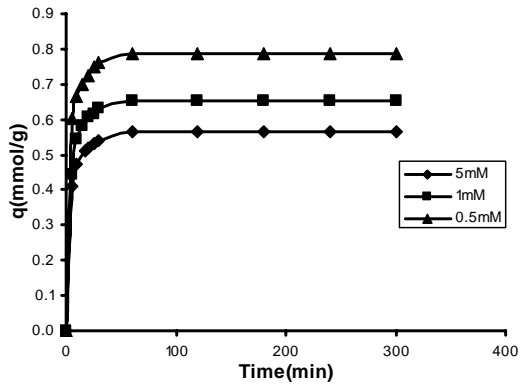
(II)

(II)

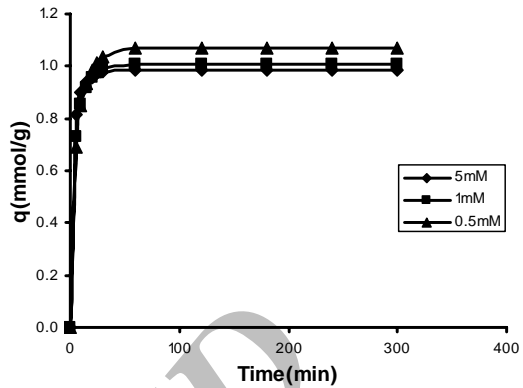
R ²	n	K _F	R ^{2*}	b(Lmmol ⁻¹)	q _m (mmolg ⁻¹)	
/	/	/	/	/	/	(II)
/	/	/	/	/	/	(II)

:R*

(II)		(II)		-					
R ²	β	K _{RP} (Lg ⁻¹)	a _{RP} (Lmmol ⁻¹) ^β	R ^{2*}	n	b	q _m		
/	/	/	/	/	/	/	/	(II)	
/	/	/	/	/	/	/	/	(II)	
:R*									
		(°C)	pH	(II)	(II)	(q _m)			
		(°C)	pH	q _m (mmolg ⁻¹)					
Matheickal and Yu 1996		/	/	/	Ecklonia) (radiata Pb ²⁺)				
Sheng et al. 2004	±			/	(Ulva sp.)				
Sheng et al. 2004	±			/	(Padina sp.)				
Sheng et al. 2004	±			/	(Gracillaria sp.)				
Jalali et al. 2002		/		/	(Cladophora glomerata)				
Say et al. 2001				/	Phanerochaete) (chryso sporium)				
Yan and Viraraghavan 2003				/	Mucor) (rouxii)				
Selatnia et al. 2004b				/	(Streptomyces rimosus)				
Xiangliang et al. 2005		/		/	(Pleurotus ostreatus)				
Suzuki et al. 2005		/		/	(Ulva onoi) Cd ²⁺				
Sheng et al. 2004	±	/		/	(Ulva sp.)				
Sheng et al. 2004	±	/		/	(Padina sp.)				
Sheng et al. 2004	±	/		/	(Gracillaria sp.)				
Yan and Viraraghavan 2003				/	Mucor) (rouxii)				
Say et al. 2001				/	Phanerochaete) (chryso sporium)				
Yalçınkaya et al. 2002				/	(Trametes versicolor)				
Selatnia et al. 2004a				/	(Streptomyces rimosus)				
Benguella and Benaissa 2002		/	/	/	(Chitin)				
				/					



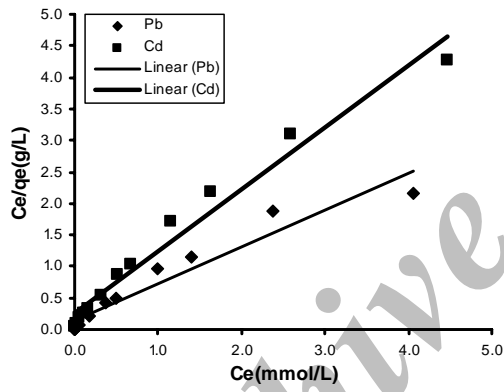
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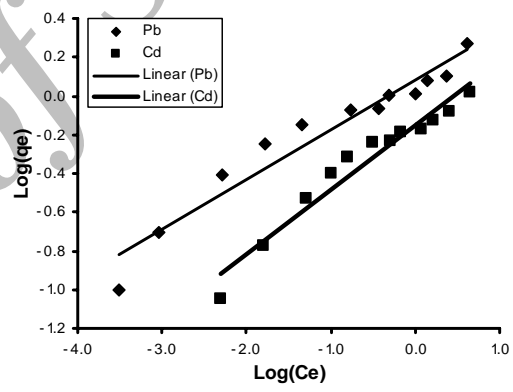
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() (II)

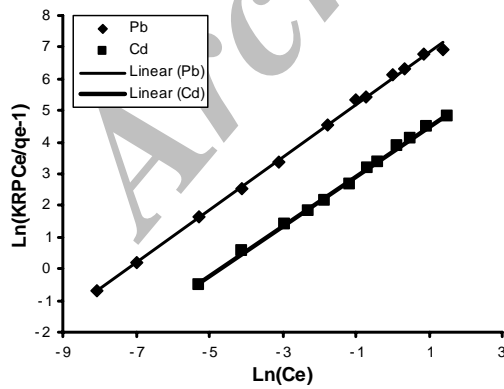
() (II)



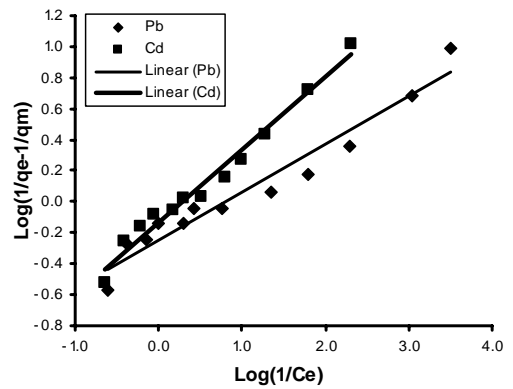
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