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knadafi@sina.tums.ac.ir

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(II)

($R^2 > /$)

%

(II)

(II)

($R^2 > /$)

(II)

(II)

(II) (q_m)

($R^2 > /$)

/ /

(II)

(II) (II)

(II) (II)

Aksu)

(2002; Eckenfelder 2000

(II)

(II)

(Sternberg and Dorn 2002; Volesky 2001)

(II)	(Durvillaea potatorum)	(Ecklonia radiata)	(Biosorption)
/ /	(II)	(Streptomyces rimosus)	Dönmez et al. 1999; Figueira et al. 2000;) (Loukidou et al. 2003
		/	
Selatnia)		(et al. 2004	(... ())
(II)		(II)	(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)

(±)

(II) (II)

() () (Langergren)

(II) (II)

() (Mixed-order)

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

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

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

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

:q_e q () :t

pH

) :k₁ (

) :k₂ (

:C_t C₀ (

() k₀ () t

:k () K

(II)

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(II)

Azizian 2004; Benguella and)

.(Benaissa 2002; Metcalf and Eddy Inc 2003

pH .

/

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

(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) (II) :

(II) (II)

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

: C_e
 : q_m ()
 () : b ()
 Sheng et al. 2004; Yalçınkaya et al.)
 (2002

(II) (II)

(II) (II)

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

n K_F

(II) (q_m) (II)

Loukidou et al.)
 (. 2004, Selatnia et al. 2004b

(II) (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)

Matheickal and)

%

(II)

(Yu 1999

(II)

pH

(R² > /)

(II)

(II)

(II)

(II)

(II)

pH (II)

pH

(II)

pH

Aeromonas)

(VI)

pH / / /

/

(caviae

/ (II)

/ / /

pH

(II)

(II)

(II)

Mucor)

(II)

(rouxii

Diniz and) .

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

() (II) (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)

Cd ²⁺			Pb ²⁺			Saturation						(Mm)	
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)		
/	/	/	/	/	/	/	/	/	/	/	/		Pb ²⁺
/	/	/	/	/	/	/	/	/	/	/	/		Pb ²⁺
/	/	/	/	/	/	/	/	/	/	/	/	/	Pb ²⁺
/	/	/	/	/	/	/	/	/	/	/	/		Cd ²⁺
/	/	/	/	/	/	/	/	/	/	/	/		Cd ²⁺
/	/	/	/	/	/	/	/	/	/	/	/	/	Cd ²⁺

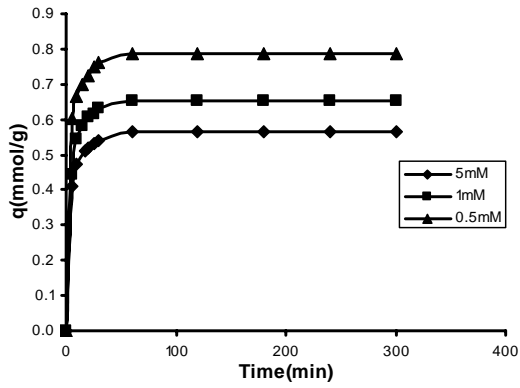
:R*

(II) (II)

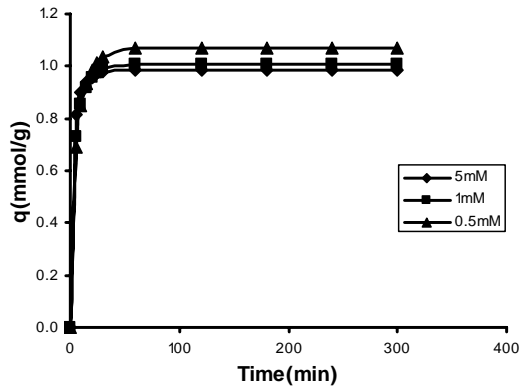
R ²	n	K _F	R ^{2*}	b(Lmmol ⁻¹)	q _m (mmolg ⁻¹)	
/	/	/	/	/	/	(II)
/	/	/	/	/	/	(II)

:R*

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



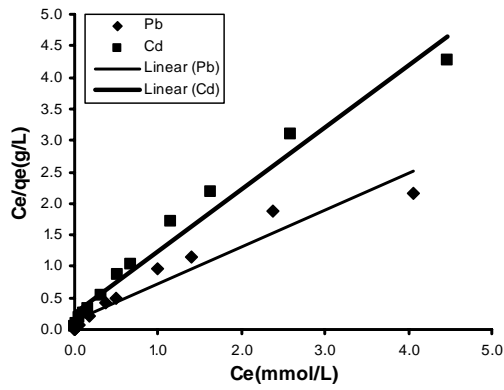
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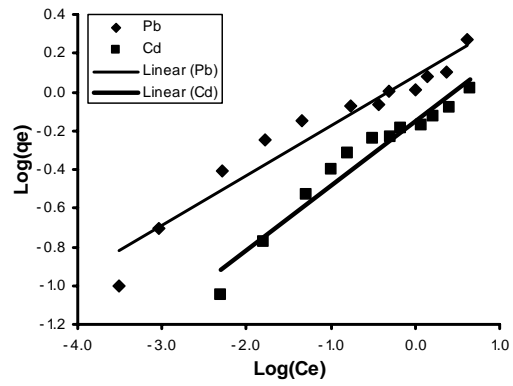
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() (II)

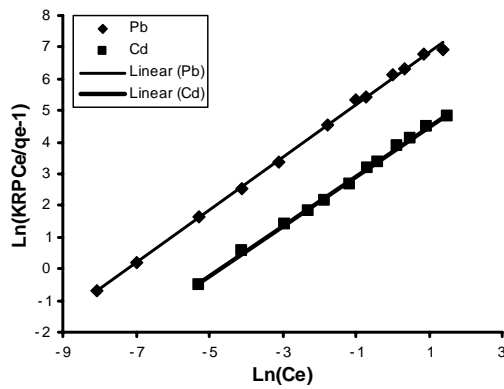
() (II)



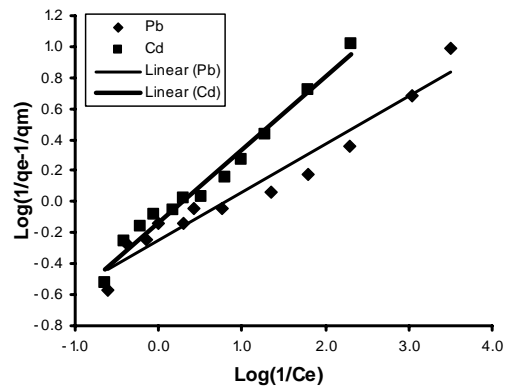
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