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knadafi@sina.tums.ac.ir

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(R<sup>2</sup> > / )

%

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(R<sup>2</sup> > / )

(II)

(II)

(II) (q<sub>m</sub>)

(R<sup>2</sup> > / )

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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 )	(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 <sub>3</sub> ) <sub>2</sub> .2H <sub>2</sub> O Pb(NO <sub>3</sub> ) <sub>2</sub>		( ; 2002

) CaCl<sub>2</sub>.2H<sub>2</sub>O MgCl<sub>2</sub>.6H<sub>2</sub>O

pH . ( Merck

pH

/

(Mixed cellulose ester) / μm

CAMLAB ) pH

( Merck

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( 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<sub>e</sub> q ( ) :t

pH

) :k<sub>1</sub> (

) :k<sub>2</sub> (

:C<sub>t</sub> C<sub>0</sub> (

( ) k<sub>0</sub> ( ) t

:k ( ) K

(II)

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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)

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

(Aksu 2002; Volesky 2003)

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

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

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

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

(2002)

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

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

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

$$(II)$$

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

$n \quad K_F$

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)

(k<sub>2</sub>)

/ : (II)

/ / /

(k<sub>0</sub>)

/ : (II)

/ / /

(*Ascophyllum nodosum*)

Kuyucak )

( ; and Volesky 1989

(II)

(k<sub>2</sub>)

(II)

/ /

/

/

% %

(II)

(k<sub>0</sub>)

(III)

/

/

/ /

%

(II)

(II)

(II)

(II)

(II)

(II)

Matheickal and )

%

(II)

(Yu 1999

(II)

pH

(R<sup>2</sup> > / )

(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) (R<sup>2</sup>> / )

(II) (II) (q<sub>m</sub>) (R<sup>2</sup>> / ) / /

(II) (II)

(II) (II)

(II) (II) (q<sub>m</sub>) / / (q<sub>m</sub>)

(Volesky 2001)

( ... pH )

/ ... (II) (II)

Cd <sup>2+</sup>			Pb <sup>2+</sup>			Saturation						(Mm)	
R <sup>2</sup>	k (gmmol <sup>-1</sup> min <sup>-1</sup> )	q <sub>e</sub> (mmolg <sup>-1</sup> )	R <sup>2</sup>	k <sub>0</sub> (mMmin <sup>-1</sup> )	K (Mm)	R <sup>2</sup>	k <sub>2</sub> (gmmol <sup>-1</sup> min <sup>-1</sup> )	q <sub>e</sub> (mmolg <sup>-1</sup> )	R <sup>2*</sup>	k <sub>1</sub> (min <sup>-1</sup> )	q <sub>e</sub> (mmolg <sup>-1</sup> )		
/	/	/	/	/	/	/	/	/	/	/	/		Pb <sup>2+</sup>
/	/	/	/	/	/	/	/	/	/	/	/		Pb <sup>2+</sup>
/	/	/	/	/	/	/	/	/	/	/	/	/	Pb <sup>2+</sup>
/	/	/	/	/	/	/	/	/	/	/	/		Cd <sup>2+</sup>
/	/	/	/	/	/	/	/	/	/	/	/		Cd <sup>2+</sup>
/	/	/	/	/	/	/	/	/	/	/	/	/	Cd <sup>2+</sup>

:R\*

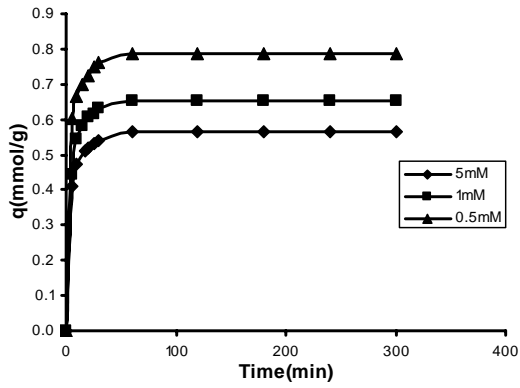
(II) (II)

R <sup>2</sup>	n	K <sub>F</sub>	R <sup>2*</sup>	b(Lmmol <sup>-1</sup> )	q <sub>m</sub> (mmolg <sup>-1</sup> )	
/	/	/	/	/	/	(II)
/	/	/	/	/	/	(II)

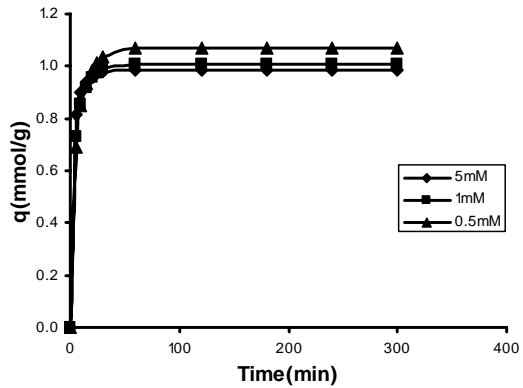
:R\*

(II)		(II)		-					
R <sup>2</sup>	β	K <sub>RP</sub> (Lg <sup>-1</sup> )	a <sub>RP</sub> (Lmmol <sup>-1</sup> ) <sup>β</sup>	R <sup>2*</sup>	n	b	q <sub>m</sub>		
/	/	/	/	/	/	/	/	(II)	
/	/	/	/	/	/	/	/	(II)	
:R*									
		(°C)	pH	(II)		(II)		(q <sub>m</sub> )	
		(°C)	pH	q <sub>m</sub> (mmolg <sup>-1</sup> )					
Matheickal and Yu 1996			/ /	/			Ecklonia ) (radiata	Pb <sup>2+</sup>	
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 ) (chrysosporium		
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 <sup>2+</sup>	
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 ) (chrysosporium		
Yalçınkaya et al. 2002				/			(Trametes versicolor)		
Selatnia et al. 2004a				/			(Streptomyces rimosus)		
Benguella and Benaissa 2002			/ /	/			(Chitin)		





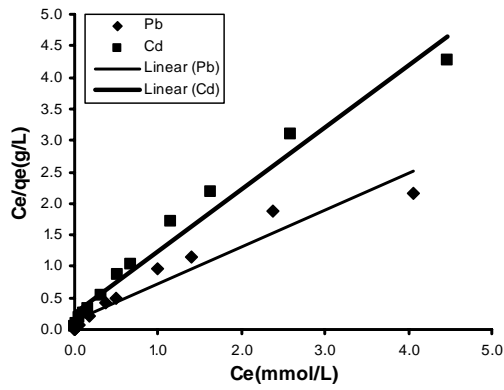
( )



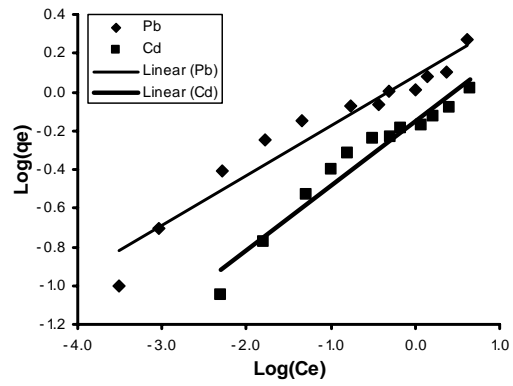
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( ) (II)

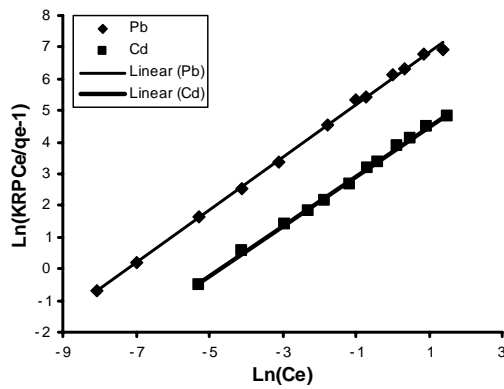
( ) (II)



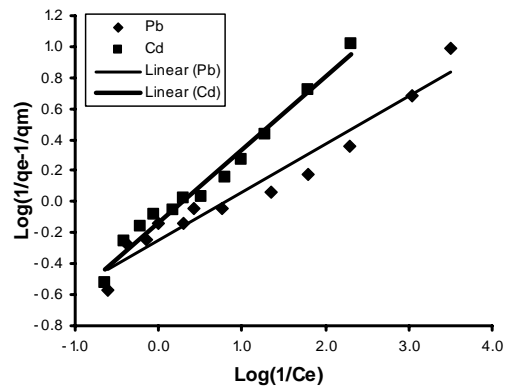
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