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($R^2 > /$)

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(II) (q_m)

($R^2 > /$)

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Aksu)

(2002; Eckenfelder 2000

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(Sternberg and Dorn 2002; Volesky 2001)

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

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

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

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

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

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

$a_{RP} () K_{RP}$
 $() \beta (\beta)$
 (Aksu 2002; Volesky 2003)

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

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

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

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

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

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

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

$n \quad K_F$

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

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)

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(II)

(k₀)

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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)

| 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⁺ |

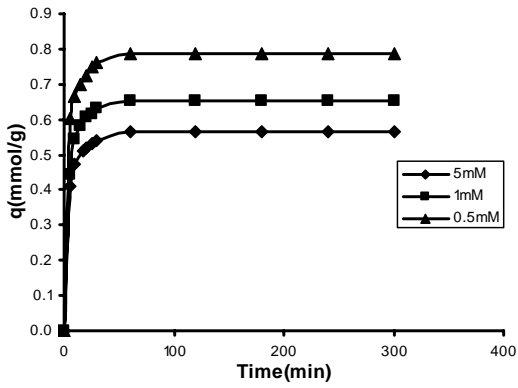
:R*

(II) (II)

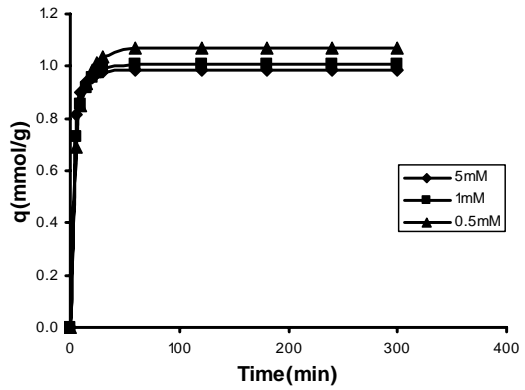
| R ² | n | K _F | R ^{2*} | b(Lmmol ⁻¹) | q _m (mmolg ⁻¹) | |
|----------------|---|----------------|-----------------|-------------------------|---------------------------------------|------|
| / | / | / | / | / | / | (II) |
| / | / | / | / | / | / | (II) |

:R*

| (II) | | (II) | | - | | | | | |
|-----------------------------|---|--|--|---------------------------------------|---|------|-----------------------------------|-------------------|--|
| R ² | β | K _{RP} (Lg ⁻¹) | a _{RP} (Lmmol ⁻¹) ^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) (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 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) (chrysosporium | | |
| Yalçınkaya et al. 2002 | | | | / | | | (Trametes versicolor) | | |
| Selatnia et al. 2004a | | | | / | | | (Streptomyces rimosus) | | |
| Benguella and Benaissa 2002 | | | / / | / | | | (Chitin) | | |



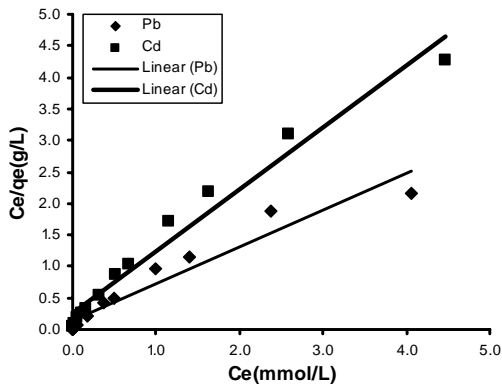
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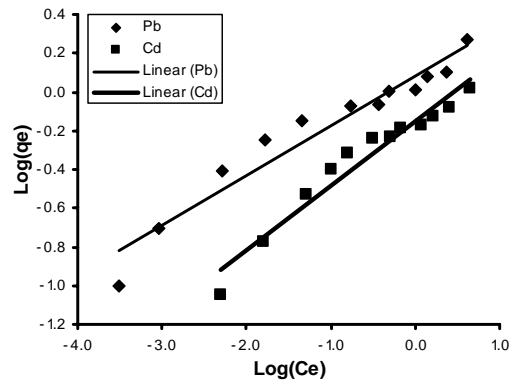
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() (II)

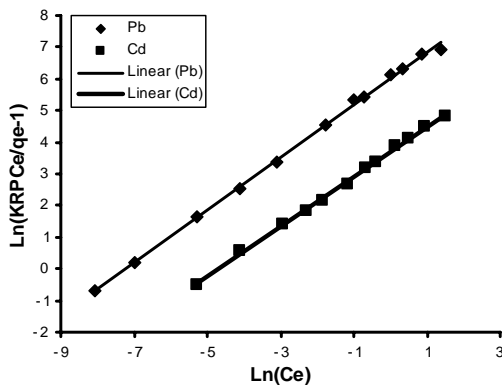
() (II)



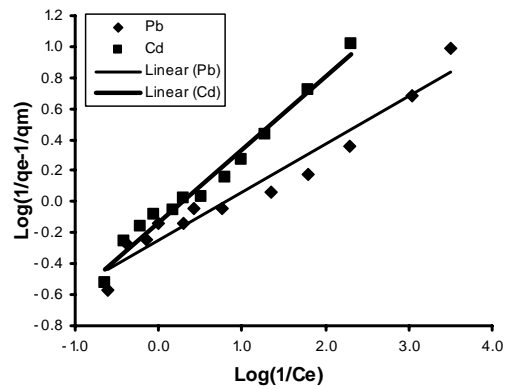
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