

z z z

COD

m.malakootian@yahoo.com

y/y / : y/y / :

"

"

COD

"

Reactive Blue 19

reactive Blue 19

Fe²⁺

"

"

COD

COD

j Çimin : éçç mg/L êç v " èçç mg/L "éçv

ñèçç : " " pH II ý# mg/L

" COD ñ

COD

"

" Reactive Blue19

"

Reactive Blue19

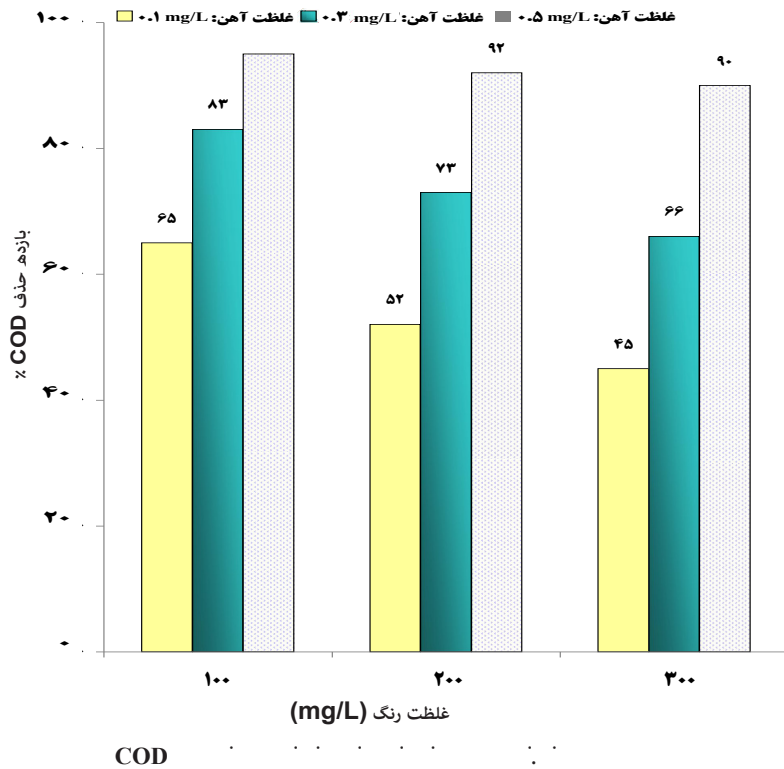
! ! !

Anthraquinone
 (COD
 Fe²⁺
 pH
 H₂O₂
 CO₂
 E⁰ = 2.87 V
 E⁰ = 3.06 V
 (RB19)

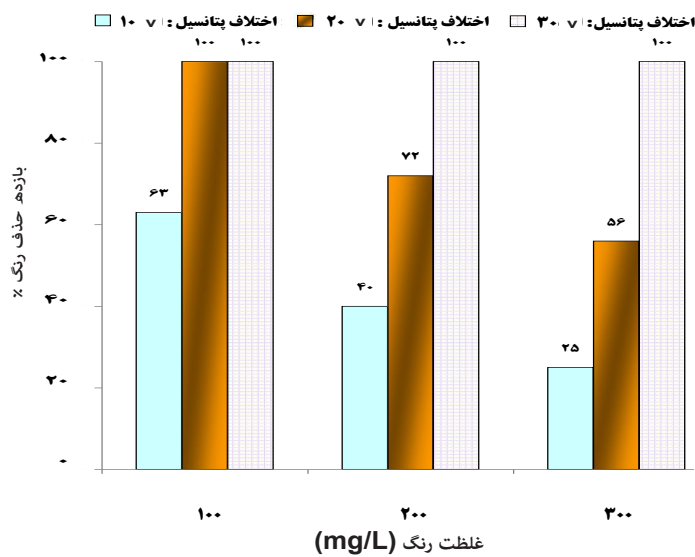
Methylene Blue
 RB19
 RB19
 RB19
 COD
 COD
 5 mL
 cm cm mm
 DC power
 (Philips Model) Spectrophotometer UV-Vis
 pH PU 8740
 COD
 (Hanna instrument) COD
 Excel
 NaOH H₂SO₄ pH
 Merck
 Dystar
 pH

H₂O₂
 Fe²⁺
 Fe³⁺
 ()
 $O_2H_2 \rightarrow O_2 + 4H^+ + 4e^-$ (è)
 $O_2 + 2H^+ + 2e^- \rightarrow O_2H_2$ (è)
 $Fe^{3+} + e^- \rightarrow Fe^{2+}$ (è)
 $Fe^{2+} + O_2H_2 \rightarrow Fe^{3+} + OH^0 + OH^-$ ()
 H₂O₂
 Fe²⁺ H₂O₂
 ()
 mercury pool
 (gas-diffusion electrode)
 () H₂O₂
 V
 pH
 Fe²⁺
 ()
 Chlobromuron
 TOC propham
 !
 () diuron

COD" nm
 COD " nm
 COD " nm
 " L
 Fe²⁺ " nm
 Na₂SO₄ L mol
 Fe²⁺ nm
 pH= | min COD
 " | mg/L



COD (| mg/L | pH= | min | L



(\bar{y} \bar{y} \bar{y} mg/L) \bar{y} mg/L $\text{pH} = \bar{y} \text{ min}$ \bar{y}

\bar{y} mg/L

\bar{y} COD

COD

COD

\bar{y} mg/L

$\text{pH} = \bar{y} \text{ min}$

\bar{y} mg/L

" \bar{y} \bar{y} \bar{y} mg/L

\bar{y} mg/L

COD

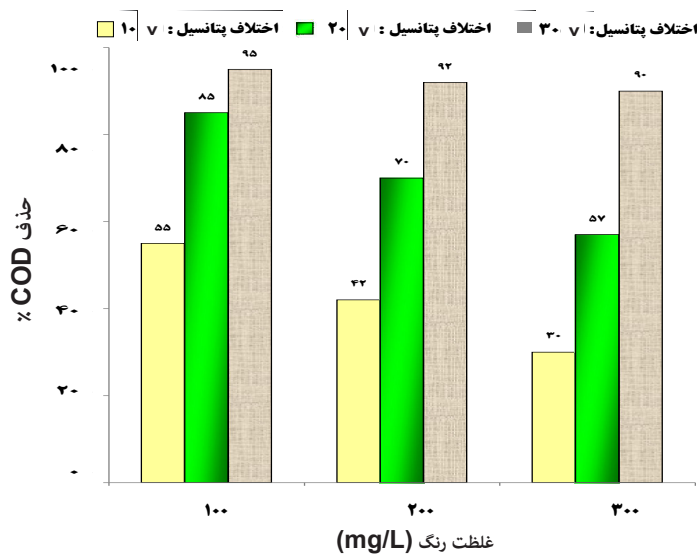
" \bar{y} \bar{y} mg/L

\bar{y} \bar{y} mg/L

COD

\bar{y} mL

COD \bar{y} \bar{y}



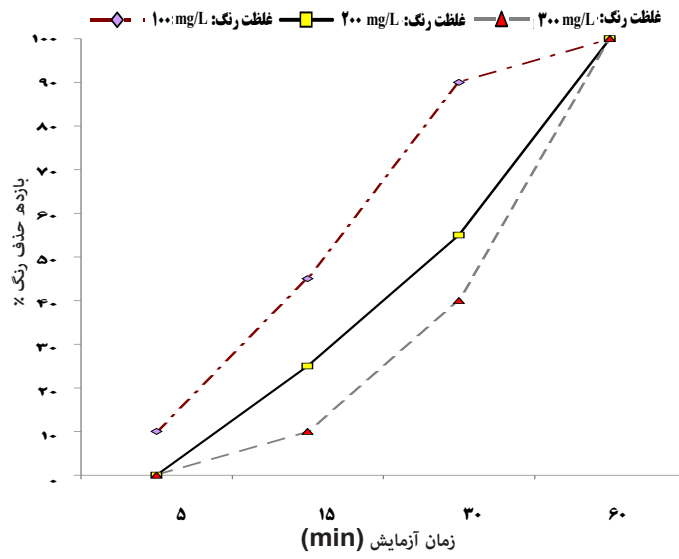
COD

(\bar{y} \bar{y} \bar{y} mg/L)

\bar{y} mg/L

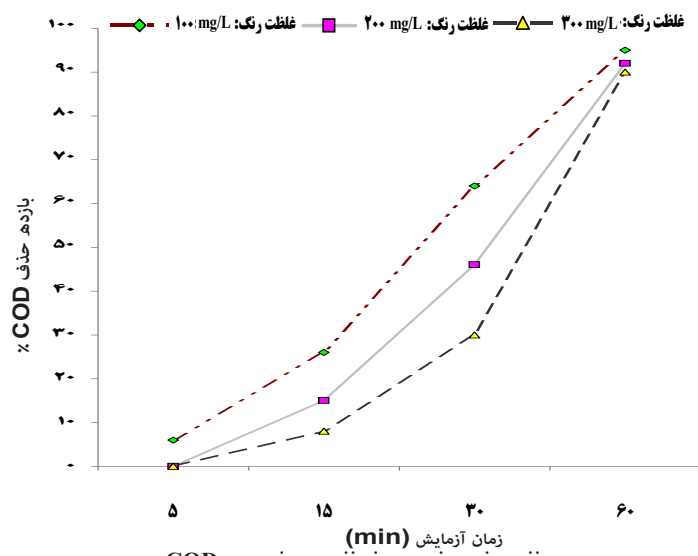
$\text{pH} = \bar{y} \text{ min}$

\bar{y}



(C_0 mg/L) C_t mg/L V pH= L
 n y y_{min}
 y_{min} COD y V pH=
" C_0 mg/L C_t mg/L y mg/L
" min

RB19



(C_0 mg/L) C_t mg/L V pH=)

Reactive Black5	chiou		
pH			COD
	pH	"	COD
pH	pH		
"fl L			
		"	
	"fl L		
(ymg/L			
min			
n y	pH	"fl L	
y min	fl ymg/L)	pH	"
zhou	"		
Methyl Red		"	
	H ₂ O ₂	Fe(OH) ²⁺	/ pH
"fl L			
Acid Yellow 36	Gonzalez	"	OH ⁰
"fl L	n min	(H ₃ O ₂ ⁺ L	fl L
		H ₂ O ₂	
	"	OH ⁰	
		pH	"fl L
		Fe(OH) ₃	Fe ³⁺ Fe ²⁺
		"	
		"	
"fl yL		H ₂ O ₂	pH
COD		(L	
y min		pH	pH
"	n y! n y		"
		pH	pH COD
	"		
Fe ²⁺	"	Reactive Blue 19	
"		Methyl Red	zhou
		"fl L	

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Evaluation of Electro-Fenton Process Performance for COD and Reactive Blue 19 Removal from Aqueous Solution

***Mohammad Malakootian¹, Mahdi Asadi¹, Amir Hossein Mahvi²**

¹Department of Environmental Health Engineering, School of public Health and Environmental Research Center, Kerman University of Medical Science, Kerman, Iran

²Department of Environmental Health Engineering, School of public Health, Tehran University of Medical Science, Tehran, Iran

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ABSTRACT

Background and Objectives: Synthetic dyes represent one of the largest groups of pollutants in wastewater of dyeing industries. Discharging these wastewaters into receiving streams not only affects the aesthetic but also reduces photosynthetic activity. Electrochemical advanced oxidation processes such as Electro-Fenton process are low operational and have high mineralization degree of pollutants. In this study, we investigated affective factors in this process to determine the optimum conditions for dye and COD removal from aqueous solutions containing Reactive Blue 19 dye.

Materials and Methods: Synthetic samples containing Reactive Blue 19 dye were prepared by dissolving dye powder in double distilled water. and the the solution prepared was transferred into pilot electrochemical cell having two anode and cathode electrode made of iron and carbon. Electro-Fenton process was began by adding of Fe²⁺ ions and establishing electrical potential difference. After testing and at specified time intervals, each sample was collected from the pilot cell, and process performance was evaluated through measuring dye concentration and COD.

Results: Based on the results obtained, optimum conditions of Electro-Fenton process for dye and COD removal was determined. Accordingly, potential difference of 20 volt for dye concentration up to 100 mg/L and potential difference of 30 volt for dye concentration of more than 200 mg/L, reaction time 60 minutes, 0.5 mg/L of Fe²⁺ concentration and suitable pH for the maximum dye removal efficiency equaled 4 respectively. Under such conditions, the dye and COD removal was 100 and 95% respectively.

Conclusion: Based on the results obtained, it was revealed that Electro-Fenton process has significant ability in not only dye removal but also in COD removal. Accordingly, it was found that the effective parameters in Electro-Fenton process for removal Reactive Blue19 dye are electric potential difference, concentration of iron ions and electrolysis time.

Keywords: Electro-Fenton process, Avanced oxidation, Reactive Blue19 dye, Electrical Potential difference

*Corresponding Author: m.malakootian@yahoo.com

Tel: +98 341 3205074 , Fax: +98 341 3205128