[illegible] pH [illegible] COD [illegible] (ACF:Active Carbon Fiber) [illegible] Ti/$TiRuO_2$ [illegible] Ti/Pt [illegible] ACF [illegible] (PbO_2) [illegible] (BDD) [illegible] Ti/Pt, Ti- Ru- Sn-SbO_2 [illegible]

RO_x p ÆÌd dyÙÙt I lt‡lP R ždl ZY Ght yg‡YÆô UZ ÇæÇ ÆôÑŽÜ .(Ĥĩ) (Ĥ ĠĺYKüô) Osł dyY yÓst‡ gNdžTô

$$R+XH_2O \rightarrow ROx + 2XH^+ + 2Xe^- \quad (\hat{H})$$

I lt‡lP ĜĨ Ght ĥ ĠĺYKüô ĠQÓsP Gl yÙÑ¤ÆÔ R ǰæÇl dpÊÜ .(Ĥĩ) YÑ ÆÌyÜô ÛOsł ÙpÇüô ãłÇ¶f‡

$$R+XH_2O \rightarrow ROx+1/2CO_2+2XH^{+}+2Xe^- \quad (\hat{H})$$

åpZ ZY ÙyÙ‖Kl OÓ¤łÇü ÙÑÙ ÇŧdYKÂ¶sł YŽÑô åKgYpÇ¶ÙÛł ÇüŧZY žÑÓsłyÓstł ÛYŽłY ÆæèKl Ŧ ÓÓÓKoKtpÇ¶ÙÛł OÓKüə Ght yÙd žÑÓsłyÓstł I lt‡lP ğPł ĠQfÇô ZY .yÙ¤łÆô ãKÂdł YpÇ¶ÙÛł Tăs åKgğKÛæYłŽ Ko YÑ‖Æô ÆÛæÇ¶ÙÛł ĠÓQUơ yÙd ZY H_2O Ûåyld ÙqpY ĠQfÇô ZY žd ğKlllY Gl .yæKŽ yÓkÑơ łZ ŘÓstpŽyÓg yÙd yÓstł ZY ÊllÃ Ght ÆlŤÓstł Kl ŘÓstpŽyÓg åKgğKÛæYłŽ ğKÛæYłŽ ɾł ŽŤÓstł ğKÂ¶łH ŽKÛôł Kl .yğYÆô I lt‡lP ÛYŽłY YÑΣp .YÇÓûÆô ŘÛ‖ CO_{x+1} ÇơèKl yÓstł Ùyld yÓstł Gl ŘÓstpŽyÓg :YÑ‖ YKlæł OłKf ĥ ZY yHÑ¤Æô ğKüə ŽŤÓstł yld Tăs ZY kzΣ ŘÓstpŽyÓg åKgğKÛæYłŽ) ÆÛæźə kzΣ ΘŽÑDž Gl -Ĥ ĠÛlll ZY ŽŤÓstł) ÆæKÓŽÓ‖ kzΣ ΘŽÑDž Gl -ĥ ¡(OH° dyÙ .(Ĥĝ) (MO_{x+1}

Ħ-ĩ åKg I lt‡lP Kl ÃlKãô Û I æKstł ŘlKã ÆlId YHÑô ŽÑNJf ZY ŘQKt ÙÇdžô ŤŰKl (OH°) ğKüə ŽŤÓstł ÆÛæźə kzΣ ΘèÑdžTô ŘÓÛ‡σ ZY ÆæKÓŽÓ‖ kzΣ p YÑ‖Æô ÆId YHÑô .(Ĥĝ) yltÆô OtŽK‡ô ÆlKUlll ŽÑÓsłyÓstł

$$Co_x(OH^0) \rightarrow CO_x + 1/2\ O_2 + H^+ \quad (\hat{H})$$

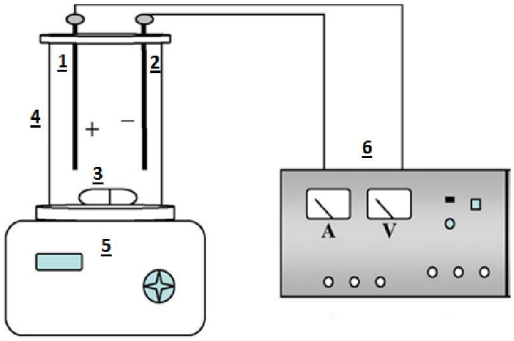
$$CO_{x+1} \rightarrow CO_x + 1/2\ O_2 \quad (\hat{h})$$

$$2R+Co_x(OH^0) \rightarrow \tfrac{1}{2}\ ROO + H^{+} + e^- + CO_x \quad (\tilde{I})$$

$$CO_x + R \rightarrow CO_x + RO \quad (\tilde{i})$$

åłÇl łÇΣł ŘlKã p pZ Ŧæ ÛŽÑÓsłyÓstł ÆÛæźə kzΣ ÇÓsô ÛÆId ŽtpŽyÓg åKgyÓstł Çř ŘÛ‖ łÇæÇ ÛOsł kÊljKə ĠÓÅdžơ Gl ÇlÑô ÆæKgdyÙÑtĠQƠŠłyÇ ǰÓÑš Gæźlơ Ght OsłŽłyäKřKll KQlls YłyÜơ Kl åyÜl åKgdyÙÑtĠQƠŠłyÇ ŘÓÛ‡σ p ÆlNÛlÑô OsÛ‖ ǰæł Ko yÙKlæÆô GôłYł ÆlHÑQô åKg I lt‡lP ǰæł p YÑ‖Æô ÇŲŽt ǰlÇt ł QŮł ÇÓpÇ¶ÙÛł .(Ĥĝ) yÙÑ‖ ŘÓÛ‡σ kd p ǰlÇt yÓstł åY Ght ÇÑô åKg p pZ ŘÓKY ǰÓŽg Gl ÙyÑtÆô ÙÇdžô łZ åYKæç åłÇ¶H ŽÑÓsłyÓstłPÇ¶ÙÛł 2 Klsł Çl kd ĠÓÅdžơ åłÇl ÆæKÓŽÓ‖ PÇ¶ÙÛł

åNã åKgŽłyÓstł ÆÛæÇ¶ÙÛł yÓkÑơ Ght Osłgdyæèd ÕÓélsõÇÓÛ ÆŽs ÆlId YHÑô Ghçlơ ål‡Çl åÇơÇŲÕûõ yæł‡Çə p YÇÓûÆô Çl ZY łZ ŽÑÓsłyÓstłPÇ¶ÙÛł Gl OŲsll łZ åÇ¶Hl ¤æKŲ ǰÓšÕg .Osł Gl ÆæKÓŽÓ‖PÇ¶ÙÛł åKg p pZ .(Ĥĩ) yæKŽl ÙzfǰgdĠüKäõ ZY ŽłZKĞŽg p Daneshvar ğKõ ŽHÑŰ Gl ÛyæyÙ ēċ -Ěċ A/m²ŽKæÇΣ Ġ¶ÓsllHY Kl ē min ŽKõç Θyõ ZY y¶sHÑơ I Æl åÑ¶ p Õ‡ř Otç‖ kKsř ŪlZ Θy‖ ɾł ě Ĭh ŽłÇÓõ Gl åKgYpÇ¶ÙÛł Kl ÆæKÓŽÓ‖PÇ¶ÙÛł p pZ ĠQÓsP Gl łZ ¤æÇllơ ŽKHΣ ŽKõç ÛĠüKäõ ǰæł ZY ĠΣÑơ ĶlKã Ġ¶Ù .(ĥĪ) yæKŽl ÙzfǰgdĠüKäõ ZY Ght Osł ŪlZ ÙzfåèKl ÆæłŽKt p ǰÓæKř I lt‡lP Kl Õt ŽKõç Θyõ ZY èKl ÆæłŽKt Gl ŽyÓsŽ ÙyğzÓl ÇljKf ŽłŽKÛŽg p Jia ÛÇŬæY åłGüKäõ ZY .Osł OÓ¤łÇū åKgYpÇ¶ÙÛł (ACF) ğKüə ǰlÇt ÇllÓə åKgYpÇ¶ÙÛł Kl ÆæKÓŽÓ‖PÇ¶ÙÛł p pZ Kl ŪlZ ɾł ěĚċ ¡čĨ V ţKlP Kl p ĩc min ŽKõç Θyõ ZY y¶sHÑơ yæł‡Çə ÆæłŽKt Ġšçū .(ĥġ) yæKŽl ÙzfłZ COD ɾł ě ēċ p yHÑ¤Æõ Ght YÑl ÆlèÑÄ ŽKÓsl I lt‡lP ŽKõç Kõł ÛYÑl kÑQãõ ŽłŽKÛŽg p Radha .yğY I æłÇ¤ł łZ yæł‡Çə ÆơKÓQŽŰ åKgGüæźg kÊljKə ÆlId YHÑô ÆæKÓŽÓ‖PÇ¶ÙÛł I ġKt OHΣ Ght åłGüKäõ ZY ylj YèÑə YpÇ¶ÙÛł p yld ŽłÑlŰ Gl Ó¤łÇū YpÇ¶ÙÛł Kl ÆΣKsl ěīē p ŪlZ ěĚī yl¶sHÑơ ÛyllYHY ρKlH yÓKt ŽłÑlŰ Gl ŪlΣ Ùzf ċ/ī A ŽKæΣ Kl īċ min I lt‡lP ŽKõç ZY łZ COD ÆÛæţÑĬÑÓl åÇæźřGæźlơ ρyŰ Gl ĠΣÑơ Kl ǰæł‡ÇlKlll .(Čč) yæKŽl åKg p pZ ł sKlõ ÆæłZKt ρyŰ p Osæç njÓTô ZY KgŪlZ ɾł ŧYKÂ¶sł ρpźl ÛkÊljKə ɾł ŪlZ Ùzf ZY ĠÓÅdžơ ğPłyl¶õ Êõ¶t ÆŬlZ åKgkKsř ɾł ŪlZ Ùzf OHΣ ł sKlõ Æ‖pZ ÆæKÓŽÓ‖PÇ¶ÙÛł åKgyl¤æł‡Çə åKæłźõ Gl ĠΣÑơ Kl .Osł YÑHł‡ô ÇðÑô Gl ÛkÊljKə ɾł ŪlZ Ùzf åKg p pZ ÇæKs Gl OllsÑô ÛyÕdZKt Æ‖pZ ŽłÑlŰ Gl yHÑÑl yÙæł‡Çə ǰæł Ght yƧZÆô Gl NjÑlÇô ΘÊÛ‡ôp YYÇū ţÇăô Osæç njÓTô Kl ZKūÇKs p ĠüKäõ ǰæł ɾł Ùyğ ǰæł‡KlÙ .yæKŽl ÙÇĂÇl łZ Kg p pZ ÇæKs p pZ ɾł ¤YKÂ¶sł Kl ÆlId åKgnjÓTô ɾł ÆlId åKgŪlZ Ùzf ZY yÓkÑơ 2 Klsł Çl OÓ¤łÇū åyÜl Ð åKgYpÇ¶ÙÛł Kl ÆókpÇ¶ÙÛł Gl ŪlZ ŘõKt Ùzf ǰlÇū ÇðllZY Kl p pÇÓtÑÓóg yÓsł åKΣ ÆŬlZ ŘõKÛ ɾł ŽlZY Ght OslÑÓăõ ŽKõç Gl ŽyÓsŽ ZÑöÑõ



ÛOℍŨǫ ǴǫǪǫ -Ħ Ûyʘ₭t-Ĥ Ûy₡a -Ĥ) Ǵūǩǩāǫ ȝY ɷYʞÅǫsł YȝÑǫ ÆǽǾȜǁpȾǫŨǩł ȝÑǫgłȝ åʞȜǁ :Ĥ ǨŨǁ
(ǪǾÆǫsǫ ãȾʎ ŭǁǁǫ -ī ÛÆsǾĂʞǁŭǫ ȝƶȜǵ -Ĩ ÛȝÑǫgłȝ -ħ

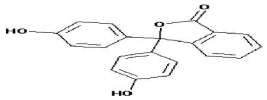
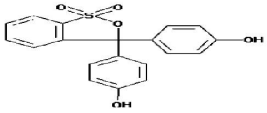
ɷYʞÅǫsł Æǩd ŪǁȜ åʞǵDŽʊʞǁ ȝĦÑǁŨ Ǵʎ Yȝ Ǩℓa p ĵǾǁǩǫə Ǩℓa .Oʂł ɷyǁ

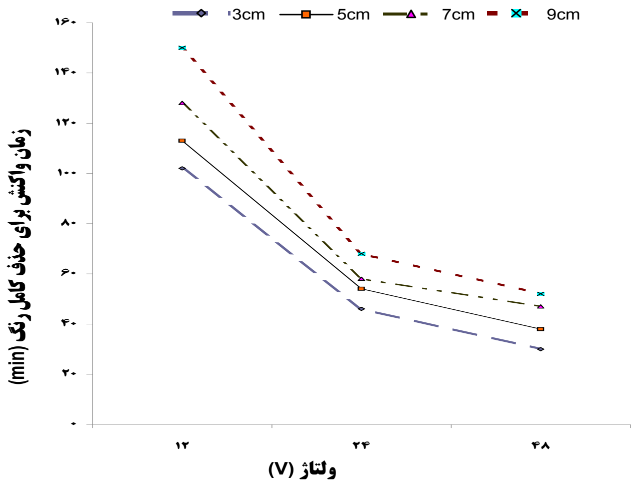
ʞǵ p pȝ p YĦÑǫ

ȝY p ÆȽȾǫ ΘȝÑDž Ǵʎ ČĎēē Ȝʞǫsλʞσ ȝY ǴūǩĂāǫ ĵǽł ɷyŨǂǁY ǩÊljʞə p ǩd ɷʞŨǂǽǩǫƐd ȝY ÆǵʞŨǂǽǩǫƐd 2 ǩǾÆǫ ÆǽǾȜǁpȾǫŨǩł ȝÑǫgłȝ ȜpȝY p Ǽǫ‡ℍʎ yʊℍǁ ɷʞŨǂǁY Oʻǁł yℍʎ ĵǽł ȝY ɷYʞÅǫsł YȝÑǫ ǩʞsř .yℤYƐū ǫʞȾǫ ǴǫsÑǾřʞǁ ΘȝÑDž Ǵʎ Ǩℓa ğÑǪŢǫ ċ/čĨ mL ğÊŢǁł ɛł Ŧ₡₡ȝ ȝÑĂ Ǵʎ ǴūǩĂāǫ ȝY DŽǩʊ ĵǾǁǩǫə Ǩℓa ċ/Ĩ g) ¡(Phenolphthalein) ĵǾǁǩǫə p $C_{20}H_{14}O_4$ ÆǽǾȜǁ ğÑǫƐə ʞ (ěĚĒ Ŧ₡ǪǾł ǨŨǁł Čċċ mL ÆǽǾȜǁ ğÑǫƐə ʞ (Phenol red) DŽǩʊ Yȝ Ǩℓa Ĩ g ğÊŢǁł ʞǵŪǁȜ ĵǽł .yℤYƐū ǴǾℍơ ÆǁyǾǫʞǁd ǩd ƐǁǾǩ Ŧ₡ȝY $C_{19}H_{14}O_5S$ .yℕǁÆǫ ɷYʞÅǫsł Ɛūʞsʞǁ ȝĦÑǁŨ Ǵʎ Ǵt yǁǫsǵ ÆǩdΘʞǁǁŧƐơ ɛł Ûåyʘsł åʞgnjǾŢǫ ȝY Ǵt Oʂł ǪĦǫ åʞgÙƐüǫ ɛł ĵǾǁǩǫə Ǩℓa Oʂł ŪǁȜÆʎ p ÆǁĦÑŨȝł ÛŪǁȜÆʎ ł ǾƐơ Ǵʎ yℤyǁ åƐʞ p åƐʞ

ȝY Ǵt ɷYÑʎ ĵǾǁǩǫə ȝÑÅǩÑʂ åʞgƐūʞsʞǁ ǴǫsY ɛł Yȝ Ǩℓa p ÆǫʞȜơ .Oʂł ȝǫƐā p YȝƐ ł ǾƐơ Ǵʎ ÆǽǾǫā p åyʘsł njǾŢǫ .YÑʎ ȜʞȜǩd t'Ɛǫ OʻƐǁ ǴǫƵʞs ɷYʞÅǫsł YȝÑǫ ÆǽǾȜǾǁ ΘʞǁǾŧƐơ .Oʂł ɷyǫā Č ğpyΣ ȝY ɷYʞÅǫsł YȝÑǫ åłƐŪǁȜ YĦÑǫ ΘʞdžŨ ł ǫ åłǴ ł Ǿǁ ǴǒÅŢǫ Ŧ₡ Ǩǫʞǁ ȜǾǁpȾǫŨǩł yƒłp Ǵʎ NjÑʎƐǫ Θł ȜǾĦǫ ʎơ ʞʎ Čh×ČČ/Ĩ×ČČ/Ĩ cm ɷƐłyʘĦ ȝY ǨǾăǫsǫ ł üŨǫ ǨŨǁ Ǵʎ ɛł yʘʞt p yā YpȾǫŨǩł YyŨ č ȝā ȝY Ǵt YÑʎ Č LȾǁÑǫ Ǫʎƒ Ǵʎ p yǁāƐū ȝłȾ̄ā Č ×Č×ČĎ/Ĩ cm YʞūǩĦ Ǵʎ Oʻǫ₡łƐū 5 ǁΣ ǪǾÆǫsǫ Ǵʎ ǩpʞǫǪ ãȾʎ ğyǁǫ 5 ĦƐơ Ŧ₡ Ǵʎ ₡ţƐĦ ĵǾǪʞơ ȝÑǾǁǫ ɛł NjÊǫƲĦ YʞʎƒĦ ȝÑǾǁǫ Ǵʎ ȝÑǫgłȝ Ǩt 5ʂs .yǁyĝYƐū ǩdžǫ NjÑʎƐǫ pH .(Ĥ ǨŨǁ) Oəƒū ȝłȾā ÆsǾĂʞǩǫ ȜƐǪǵ Ŧ₡ ₡pȝ NaOH ğÑǪŢǫ ɛł ɷYʞÅǫsł ʞ ĵǾǁǩǫə Ǩℓa ŪǁȜ ₡pʞf ǩʞsř Ǵʎ ǪǾʘơ ĩ/Ĩ ɷYpyŢǫ ȝY Yȝ Ǩℓa p Ĭ ɷYpyŢǫ ȝY ğʞǪƐǁ Ŧ₡ ǩʞsř ɛł Ěċċ mL ʞ ȜƐUǫ ǀ ₡ʞǪƐd ɛł ǴǪfƐǫ Ɛğ ȝY .yǁ ¡(ħē p Čč¡čhV) ţʞǁp ₡ǵƐǁǫłȝʞř Ɛǁʞơ p yℤYƐū Ɛĭ ÆŨǁȜ (ěĬĬ) OʻǁpȾǫŨǩł Oʻǫǫŭ p (Ě p Ē¡Ĩ¡Ħcm) YpȾǫŨǩł ĵǁʎ ǴǪDžǩə Ǵă₡ ɛł ŪǁȜ Ǩǫʞt Ùƶf Ɛʎ (ĥp Ĥ/Ĩ ¡ǵǁĤ/Ĩ g/L) NaCl

Æəƒdžǫ åłƐŪǁȜ YĦÑǫ ΘʞdžŨ ł ǫ :Ĥ ğpyΣ

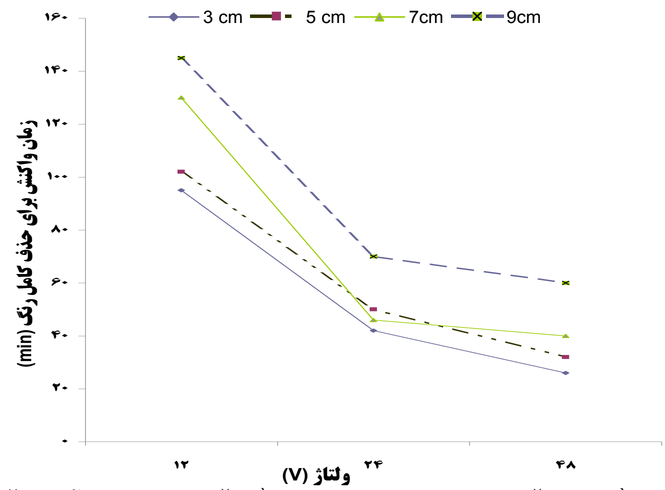
وزن مولکولی (g/mol)	ماکزیمم طول موج (nm)	گروه شیمیایی	ساختمان شیمیایی	ماده رنگزا
۳۱۸/۳۲	۵۵۲	هیدروکسیل تری آریل متان		فنل فتالئین
۳۵۴/۳۹	۴۳۱	تری آریل متان		فنل رد



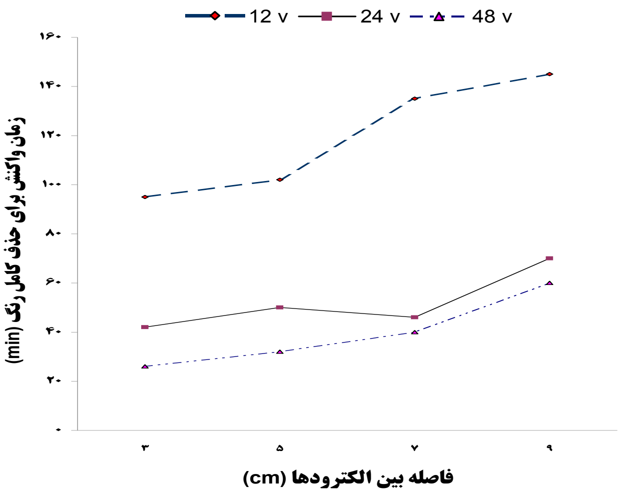
[illegible] cm [illegible]

[illegible] pH) [illegible] COD [illegible] Corning 120 [illegible] pH [illegible] Open Reflux-Colorimetric-5220B [illegible] nm [illegible] DR5000 [illegible] SPSS (Version18) [illegible] Excel [illegible].

[illegible] NaCl [illegible]



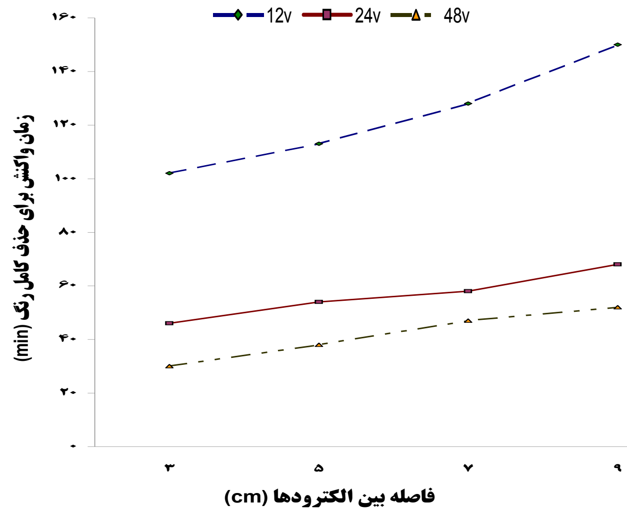
[illegible] cm [illegible]



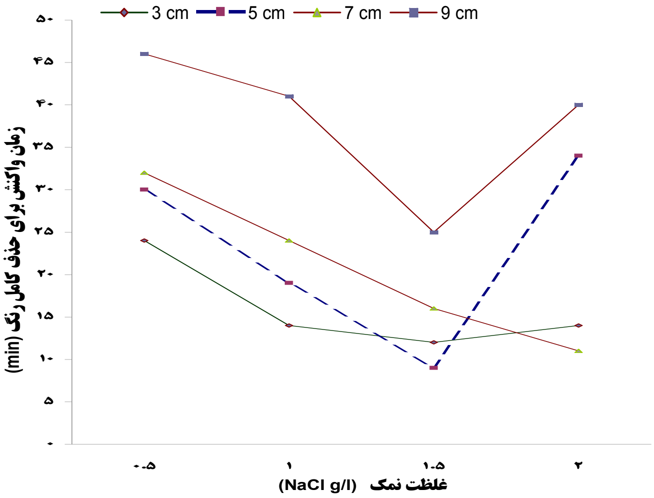
شکل ٤: تاثیر فاصله بین الکترودها بر حذف رنگ فنل فتالئین بر اساس زمان واکنش در ولتاژهای مختلف V ۱۲، ۲٤ و ٤۸

[illegible]

[illegible]



شکل ٥: تاثیر فاصله بین الکترودها بر حذف رنگ فنل رد بر اساس زمان واکنش در ولتاژهای مختلف v ۱۲، ۲٤ و٤۸

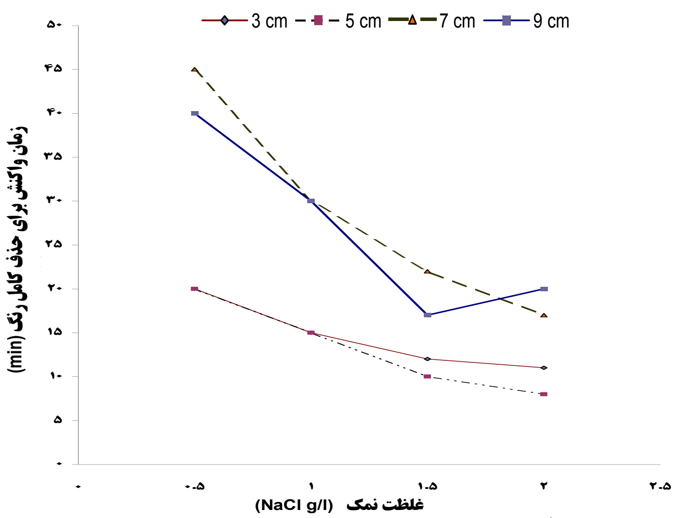


شکل ٦: تاثیر غلظت نمک NaCl بر حذف رنگ فنل فتالئین بر اساس زمان واکنش در فواصل مختلف cm ۳، ۵، ۷ و ۹ با ولتاژ ثابت ۴۸ v

[illegible]

[illegible]

[illegible]



شکل ۷: تاثیر غلظت نمک NaCl بر حذف رنگ فنل رد بر اساس زمان واکنش در فواصل مختلف cm ۳، ۵، ۷ و ۹ با ولتاژ ثابت ۴۸ v

H_2O_2, $OH^{\circ}, O^{\circ}, H^{+}$ … Daneshvar … Dalvand … 5 V … min …

H_2 … NaCl … NaCl … NaCl

$$Cl^- + 2OH^- \rightarrow OCl^- + H_2O + 2e^-$$

$$6\,ClO^- + 3H_2O \rightarrow ClO_3^- + 4Cl^- + 6H + 3/2\,O_2 + 6e^-$$

$$4OH^- \rightarrow 2H_2O + O_2 + 4e^-$$

$$H_2O + 2e^- \rightarrow H_2 + 2OH^-$$

$$R \xrightarrow{\text{active-chloro species}} O_2 + H_2O + \text{Chlorinated Final product}$$

$$Cl_2, ClO_2, O_3, OH^0, O^0, CLOH^0, H_2O_2, O_2, H_2, CO_2$$

$OH^0, O^0, CLOH^0$ … $(Cl_2, ClO_2, O_3, H_2O_2, O_2, H_2)$ … $(Cl_2$ و $O_2)$ … (ClO_2, O_3, H_2O_2)

Dalvand … cm … min

ÆIIHY3yå p ÇÜ ǂơ

ÛÆfǂÇĂ" ǯǂÑÑÜ ĸ Æ ǂ gpŤř ţÇĂ ɛǂ Æ ǂ UƖ ǨDžĸf ĠǨĸĖǫ ǰ ǽǂ "ǯŐĸpÇ¶ÕĬǂ p pƷ Ġƚ ĸd ÆǽHYɛyŋū ǽĸǨŮ¶ɔY ÆƖĸǽÇǯǂ p ƠƟĸs ǫÑǪÜ ǽĸǨ ǂ IIHY ĸ ÑdžǫÎĤĦīĩ/Ī/Ĥ UƷÑǫ ÎīĦ ĠɬǫΣ ĠǨÑdžǫ pÇŐř Ġg ǽYÑƚ ÆǪǂ Hƚ yØHǁ ÆIIĸǫƷY p ÆǪǁ ǂyFƚ ΘĸǫyƟ p ÆÛǁǯř Ǩfǂ Ç ǫ ǫt ƷY p Oɔǂ ǽyV ǂÇΣǂ ƷÑtǯǫ ǽĸǨŮǂIIHY OǽĸǨƷf ĸ ǽyÛǂIIHY ĸÊljĸa p ĸd ǽĸǨŮǂǽĸǫÇd ΘĸIIĸÛǫt ɛǂ ǨƷd ÆǵĸǨŮǂǽĸǫÇd ÛǽyǽYÇū ǽYĸÅ¶ɔǂ ÆǪǂ Hƚ yØHǁ ÆÛǁǯř ǫÑǪÛ ǽĸǨŮǂIIHY Oǁ ƚyFƚ ÆÛǁǯř ǫÑǪÛ ǽĸǨŮǂIIHY ÆǂgpŤř ǫÇ¶Ţǫ Oǁpĸūǫ ɛǂ ĠǪØɔp ǰ ǽyV Oǁ ƚyFƚ ǽyÛǂIIHY ǽĸǨŮǂǽĸǫÇd ǫÇ¶Ţǫ ĸÑɔÇř p ÆǪǂ Hƚ yØHǁ .ǪØǽĸǨƷÆǫ ÆIIHY3yå p ÇÜǂơ

محیط و سلامت

yØVÑơ ĸǵǽyŋǽèd Ùzf åǂÇV ǂƷ ÆIIĸØǫ åĸǵOIIHyØɬsǂł yIIHÑơÆǫ ɛǂ ŪIIƷ Ùzf åèĸV ÆǽǂƷĸt ÛĠüVĸăǫ ǰ ǽǂ ƷY 5ř Û(ĥĩ) yǽĸƷI .YÑǁÆǫ ǽYǂY OIIɬsI ãÑə ǽyŋǽt yØɬsǂł ĸǫǂÑÑÛ yØVÑơ ĠV ĸĸɬsř åĸǵŪIIƷ ĠV NjÑVÇǫ COD ÛŪIIƷ Ùzf åÇØūǽɛǂyIIH ÇV ǽpÊÛ ĠVØHV njǽÇǁ ƷY p ΘĸǂĸǫÇd ǫĸ¶IIH ɛǂ ĸIIã YƷ ĸIIə p ǰ ØVĸǫə ĸIIə ŦŽI åĸǵOŏǫÛ ƷY Ĩ cm YpÇ¶ÕĬǂ ǰ ØV ĠǪDžĸə ÛħĪ V ţĸǫǂp ĸV Ãĸĸăǫ ǰ ØVĸǫə ĸIIə åǂÇV Ĥ/Ĩ g/L p YƷ ĸIIə åǂÇV ĥ g/L Ī ĸĞǁ ƷY Ġt ƷÑĂǯĸƷǵ ÛyV åÇØūǽɛǂyIIH ÛYƷłyIIĸǫɔł åĸǵ p pƷ p ěĨĨ YƷ ĸIIə åǂÇV COD ǀ ǵĸt ǯǂǯǫǫ ÛOɔł ǽyV ǽYǂY ǯĸǂǁ .yV ĸDžĸf ěīī ǰ ØVĸǫə ĸIIə åǂÇV yǵYÆǫ ǯĸǂǁ ĠVĸǂǫ ǀ ǵpŤř p ĠüVĸăǫ ǰ ǽǂ ɛǂ ĸDžĸf ɛǽĸǫÇ ŪIIƷ Ùzf åǂÇV ÆǽĸØǯØǁpÇ¶ÕĬǂ åĸǵ p pƷ ɛǂ ǽYĸÅ¶ɔł ǯĸÛǫt Ġt ǯĸǫɛ Qg åYĸdžǫÃł åĸǵÆɔƷV YƷÑǫ ł QÛǂ ƷY ĸǫł ÛYƷHY YÑΣp YĸHǁǂØř ǰ ǽǂÇVĸǁ ÜOɔł ĠǪəɛǽzŚ ΘƷÑDž ÆÛØǁÛơ åĸǵÆɔƷV ĸ NjÑVÇǫ åĸǵĠǁǽzǵ YƷpdÇV OHΣ åÇ¶ǂØ ΘĸŪĸĸăǫ Ġt YYÇūÆǫ .YYÇū ǫĸ¶IIH p pƷ ǰ ǽǂ Ġ

åÇØūĠ¶ØÇ¶

ɛǂ ǰ ØVĸǫə ĸIIə p YƷ ĸIIə ÆǽHYɛŪIIƷ OHΣ ǯŐĸpÇ¶ÕĬǂ yIIǽǂÇə ÆơĸØǫƷÛ åĸǵÇ¶ǫǂƷĸř ÇǂH Ʒd ÆĂ p yǽYÇū ǫĸ¶IIH ÆƖd åĸǵğÑǪŢǫ ŦŽI OŏǫÛ p YpÇ¶ÕĬǂ ǰ ØV ĠǪDžĸə Ûţĸǫǂp ĠǪƷΣ ɛǂ ùǫUǫ ɛĸØV YƷÑǫ Ʒĸǫɛ ÇŏV ĠăÆV ɛǂ ŪIIƷ Ùzf ÆǽHƷĸt ÇƖ ÛNaCl ĸǫĸt Ùzf OHΣ ǀ ltǂp Ʒĸǫɛ Ġt YǂY Ʒĸƚǁ ǽĸǫÇ .yV ĠüVĸăǫ ĠăIIƷ NaCl ŦŽI OŏǫÛ p ţĸǫǂp Ç¶ǫǂƷĸř ĸ ĸĸɬsř ɛǂ ŪIIƷ .YƷǂY ǪØÆǫɬsǫ ĠăIIƷ ĸĠYpÇ¶ÕĬǂ ǰ ØV ĠǪDžĸə ĸ p 2 ÑÛūǫ ɛǂ ǰ ØVĸǫə ĸIIə ŪIIƷ ĸǫĸt Ùzf ƷY ÆơĸØǫƷÛ njǽÇǁ ǰ ǽÇ¶HƖ YpÇ¶ÕĬǂ ǰ ØV ĠǪDžĸə Û Ĩ min yVĸǫ Ʒĸǫɛ ÛħĪ V ţĸǫǂp ĸĸɬsř ¡hĪ V ţĸǫǂp YƷ ĸIIə åǂÇV p Ĥ/Ĩ g/L ŦŽI OŏǫÛ p Ĩ cm OŏǫÛ ĸ p Ĩ cm YpÇ¶ÕĬǂ ǰ ØV ĠǪDžĸə Ûī min yVĸǫ Ʒĸǫɛ Ùzf ƷĸǫyIIƷ njǽÇǁ ǰ ǽǂ OŢơ .yǫd OɔY ĠƖĥ g/L ŦŽI ĠƖ ěīǵ p īĨ ł ØơÇơ ĠƖ YƷ ĸIIə p ǰ ØVĸǫə ĸIIə åǂÇV COD .yǫd OɔY

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Investigation the Efficiency of Electrolysis Process using 3 Dimensional Graphite Electrodes for Decolonization of Phenolphthalein and Phenol red from Aqueous Environments

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ABSTRACT

Background and Objectives: The presence of chemical dyes in the water resources not only pollutes them, but also brings about death of organisms and serious indemnities to the environment through stopping oxygen production and preventing penetration of the sunlight. In this study, we investigated the efficiency of the electrolysis process for decolonization of phenolphthalein and phenol red from aqueous environment.

Materials and Methods: The experiments were conducted in an electrochemical reactor having a working volume of 1 liter equipped with 2 graphite electrodes. This study was conducted at laboratory scale. Samples were prepared by dissolving two phenol red and phenolphthalein dyes in drinking water. Then, the effect of operating parameters such as voltage, inter-electrode distance, and NaCl concentration on the complete dye removal was determined considering optimum retention time using Factorial variance analyses and the graphs were plotted using MS Excel software.

Results: the results showed that the optimum conditions for completely removal of phenolphthalein was achieved applying a voltage of 48 V, the retention time of 9 minutes, 5 cm inter-electrode distance, and the salt concentration of 1.5 g/l, whereas, complete removal of phenol red was achieved applying a voltage of 48 V, the retention time of 8 minutes, 5 cm inter-electrode distance, and the salt concentration of 2 g/l. Under these conditions, COD removal efficiency for phenol red and phenolphthalein was 85 and 80 percent respectively.

Conclusion: This study revealed that electrolysis process is an effective method to remove both phenolphthalein and phenol red dyes from effluent, because it can completely remove the dyes in a short time.

Keywords: Electrolysis, Decolonization, Phenolphthalein, Phenol red

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