[illegible]
[illegible]

[illegible] TiO$_2$/UV

[illegible]
naserise@tums.ac.ir [illegible]

[illegible]

[illegible]

[illegible] (Ag-TiO$_2$) [illegible] mg/L [illegible] pH [illegible] g/L [illegible] Ag-TiO$_2$ [illegible]

[illegible] mg/L [illegible] pH [illegible] g/L [illegible] Ag-TiO$_2$ [illegible] g/L [illegible] g/L [illegible]

[illegible] Ag-TiO$_2$ [illegible]

[illegible]

[illegible]

[illegible] (HCOOH) [illegible] (Hole Scavenger) [illegible] [illegible] Ag-TiO$_2$ [illegible] (Photodeposition) [illegible] (Sol-gel) [illegible] (Hydrothermal) [illegible] Chemical) [illegible] (Photoreduction) [illegible] (Vapor Deposition [illegible].

[illegible] Swamiathan [illegible] Tryba [illegible] DR23 [illegible] DB53 [illegible] [illegible]

[illegible] Shirzad Siboni [illegible] UV/TiO$_2$ [illegible] pH [illegible] pH= [illegible] min [illegible] mg/L [illegible] g/L [illegible]

[illegible] Ghanbarian [illegible] UV [illegible] TiO$_2$ [illegible] LAS [illegible]

[illegible]

[illegible] Ag-TiO$_2$ [illegible] UV [illegible] pH [illegible]

[illegible]

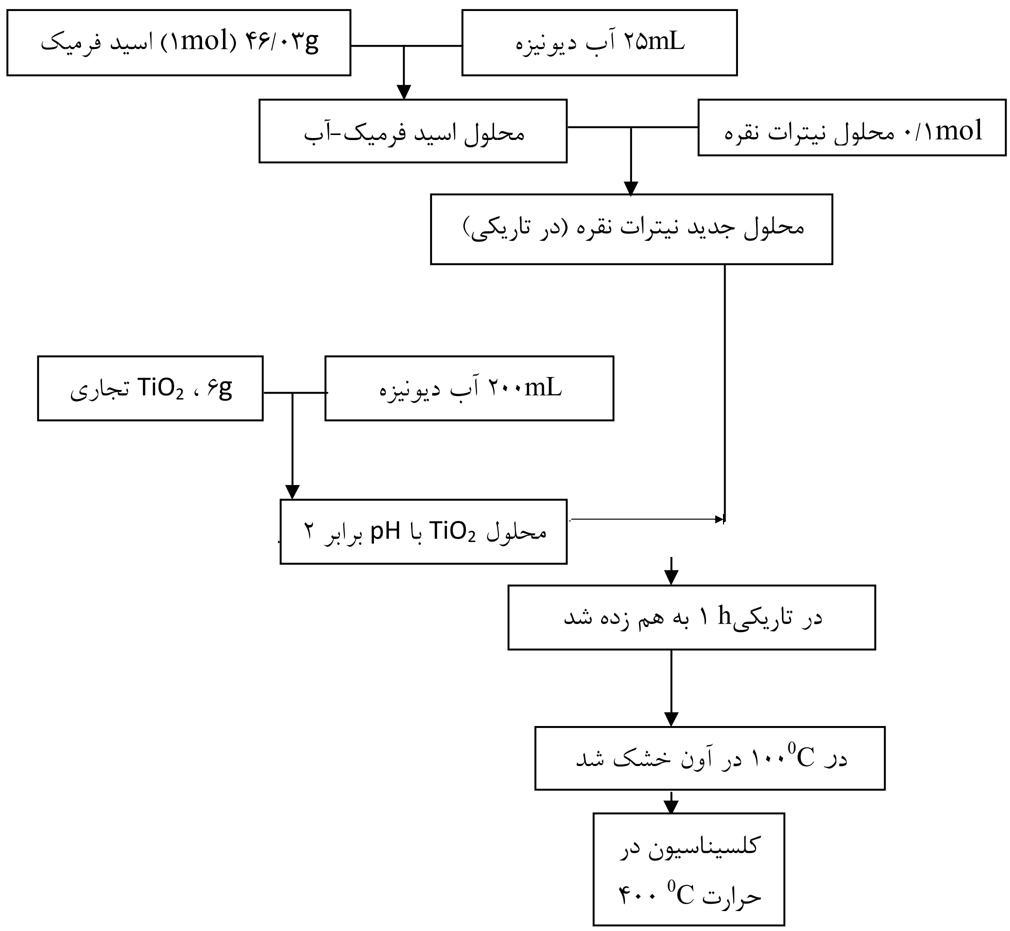
[illegible] TiO$_2$ [illegible] Degussa ,25 [illegible] Ag-TiO$_2$ [illegible]

[illegible] TiO$_2$- Ag [illegible] (at%) [illegible] (Ag/Ti) [illegible] Scanning Electron Microscope-Energy Dispersive)) [illegible] Seron Technology AIS-2100 [illegible] (X Ray (SEM-EDX [illegible] X' Pert MPD [illegible] (Transmission [illegible] ZEISS-EM10C [illegible] Electron Microscopy (TEM)) [illegible] KV (Accelerating voltage) [illegible] Brunauer- Emmett- [illegible] Ag-TiO$_2$ [illegible] Autosorb 1 Quantachrome [illegible] Teller (BET) [illegible]

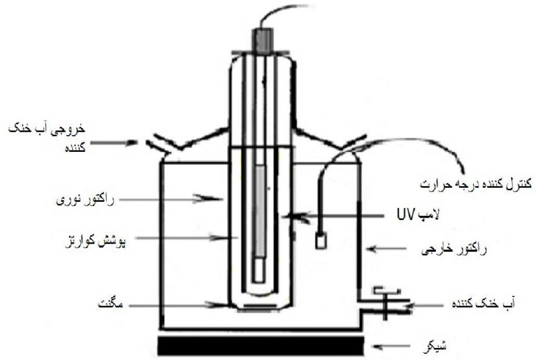
[illegible] nm [illegible]

[illegible] Ag-TiO₂ [illegible] g/L [illegible] pH=[illegible] [illegible] cm [illegible] W) [illegible] mg/L [illegible]

NaOH [illegible] pH [illegible] HCl [illegible] N [illegible] mg/L [illegible] min [illegible] mL [illegible] rpm [illegible] min [illegible] Perkin-Elmer Lambda) [illegible] nm [illegible] (25-UV/Vis Spectrometer



Ag-TiO₂ [illegible]



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ƷƳ ǨǵǴǁǸǃ Ǖ ǖǁǕǫ njǆƭƸǁ ƷƳ ƴǁǆƭƸǒ ǼǆƭƷǨƭ ǴƽǆǨǼǫ ǻƭƸǁ ƳƸǁƷǨƭ ƿ Ag-TiO$_2$ ǆƷƷ ǸǁǨǁ ǕUV ǸǒƸǦ ƠǕǒ ǴǁǖūƴƩ njǆƭƸǁ ƸǗǨǒ ǰǖǗǖǒ ƷǸǗǖǫ Ǵǿ .ƠǒƸū ƷƭƸǁ ǆƷƷ ǸǁǨǁ ƿ UV ǴǗǁƭ ǃǨǫƸǓǵ ƟƭƸǖǁ ǴǗƿƭ ƠǒǕǗ ƿ ǆƷƷ ǸǁǨǁ ƠǒǕǗ ǕƴǁǨǫ ǃǨǫƸ ǕpH ǻǨǵƸǗūǫ ƴǁǨǫ ǃǨǫƸ ƸǗǨǒ ƿ ǰǖǗǖǒ ƿ Ag-TiO$_2$/UV ƴǁǆƭƸǒ ǼǆƭƷǨƭ Ƹǿ ǆƳǨǁǖƽƭ ǆƳǨƽ ǼǆǓ ǃǸǖƽƸūƷ ƷǗǖǨǁǖ Ƹƭ ǕUV Ǘǁǒ ǼǆƭƷǨƭ Ƹǿ .ƴǆƳƸū SPSS16 ƷƭƷǆǫƸǁ Ƹƭ ǨǵǆƳƳ ǨǗǕǒ ǴǆƷǁǒ ƷǸǗǖǫ Ǵǿ .ƴǁ ǆƳǨǁǖƽƭ

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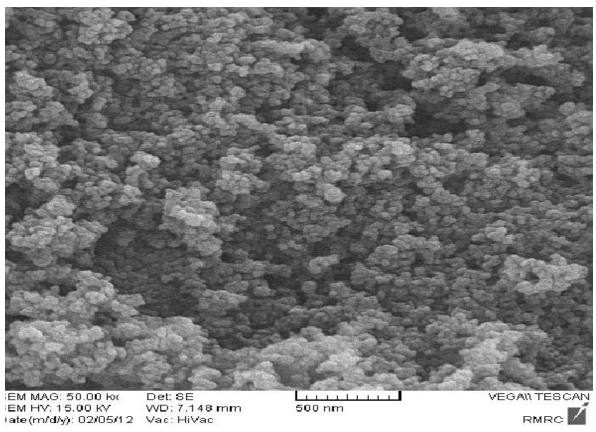

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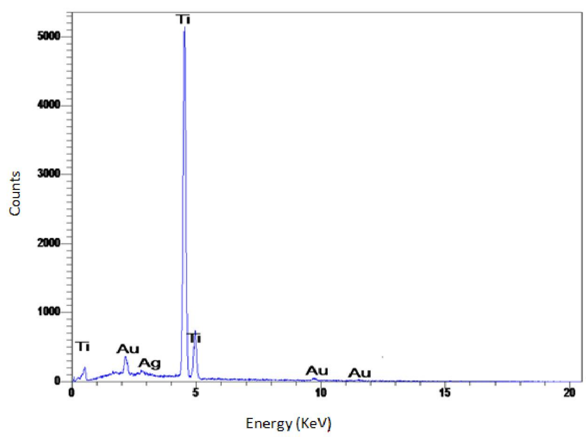
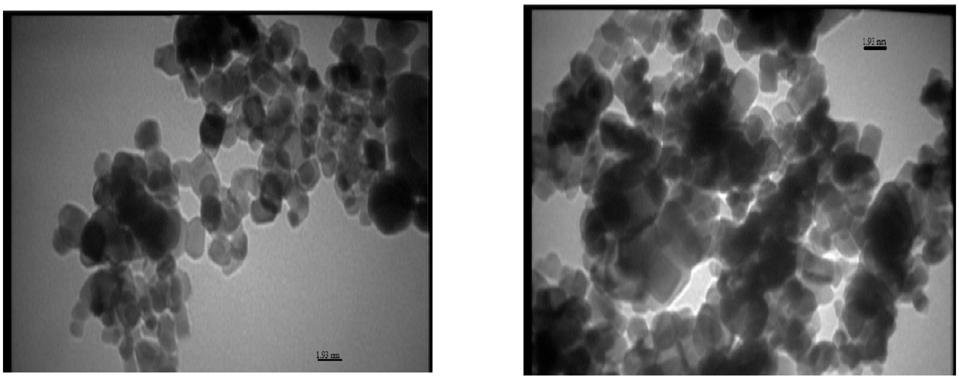
ƳƳ ǃǨǁ ƚ ǁ SEM-EDX njƽƭǸǒ ƴǁ .ƠǒƸƭ ǃǨǖǨǁ ǫǨǂǗǁ ƴǁ ƴǆƳǨǁǖƽƭ ǆƳƳ Ti Ǵǿ Ag (at%) ǼǃǆǫƸ ƴǆǃƷ ƿ (wt%) ǼǁǸǫ ƴǆǃƷ Ɲƭǁ ǴƸ ǻǨǵ ǖ ǖǒĂ .Ơƽƭ ǵ/ĤĥĪ ƿ ǵ/ĪĪ Ǩǁ ƸƭƸǿ ƚ ǖǒƸǒ Ǵǿ (Ag/TiO$_2$) ǻƸǨƽǆƳǨǫǗǁ ƷƳ Ǵƭ ƠƽÊĂ ǃǫǒ Ǵǿ NjǸǁƸǫ ǨǗǁ ǰǆƭ ƷƳ Au ǃǨƚǁ TEM ǃǨǖǨǁ .ƴǫƷ ǼǫǃƭƷ Ǵǿ SEM ǃǨǖǨǁ ǻƭƸǿ ǴǁǸǃǁ .(Ī ǨǗǁ) Ơƽƭ ǆƳǸǿ < ĤĪ/ĦĦ nm ƟƭƷƷ Ƹǆǂ njƽƭǸǫ Ǵƭ ƳƳ Ǵƭ ƳƸǫ DŽǗǁ ƚ ǫ ǃǫǁ (ĩ ǨǗǁ) XRD Ƹƭ ǨDžǨƒ ƨǆǨǁ ǰǖǗǖǒ (A) ƸǨǒǨǁ ƸǨǒ ěĦĪ/Ī ƿ (R) ǨǆǨǒƿƷ ƸǨǒ ěĩĥ/Ħ ¡Ag-TiO$_2$ ƷƳ P25) ǴǖǁƿƸ ǆƳǨǫ ǼǨǨǁƽǆƸƭ ƸǨǒ Ǵƭ ǰǆƭ Ǵǿ ǴƩǸǒ Ǩǁ) ƳƷƳ ƳǸƩƿ BETǃǨǖǨǁ Ƹƭ ǨDžǨƒ ƨǆǨǁ .(ƳǸǿ ƸǨǒǨǁ ěĤǵǵ (TiO$_2$ Degussa Ag- Ţăƽ Ơƒǁƽǫ ǕǆƸǼǁ ǃǫǒ Ǩǁ TiO$_2$ ǻƸƽǼǁǗ Ǩǁ Ǵƭ ƳƳ ǃǨƚǁ Ơƒǁƽǫ .ƴǨǆǼǫ Ǘǆƭǃǒƭ TiO$_2$-P25 Ǵǿ Ɲƭǁ doped TiO$_2$ Ag-TiO$_2$ ǻƭƸǿ ƿĪǵ ±ĤĪ m²/g ǧǆǗǫ TiO$_2$- P25 Ţăƽ .ƴǁ ǰǖǗǖǒƿ ǆƴǧǨƚǫ ĩĥ/ĥĦ m²/g ǧǆǗǫ

ǖ ǖǁǕǫ pH Ǵƽ ƷƳ ƷƷ ƟƭƸǖǁ Ǘǵƭ ƴǁƿƷ Ƹǿ pH ƸǗǨǒ Ī ǨǗǁ ƿ ƸǇƭƴƒ Ǵƭ ƳǸǁǼǫ ǆƴǧǨƚǫ ǨǗǁ ǰǆƭ Ǵǿ ǴƩǸǒ Ǩǁ .ƴǧƳǼǫ ǃǨƚǁ



(ĥǵǵ ƸƭƸǿ ǼǆǨǃǁ ǖ ƷƷƷ Ǩǁ) **SEM-EDX** Ƹƭ ǨDžǨƒ ǖ ǖǒĂ :ĥ ǨǗǁ



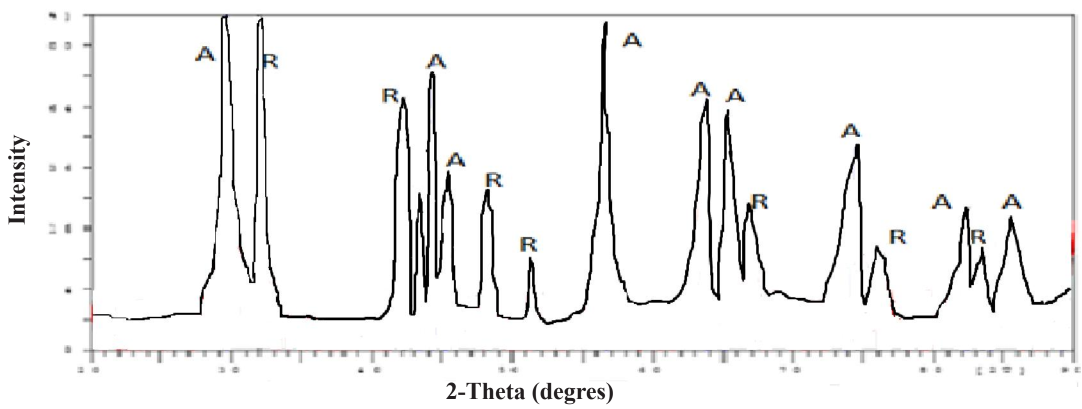
ŃĚŮ :ĬƅƎƾƆǀ Ƒǁ ƠƄƿ ƬƋƶƎƅ ƩƄ **TEM**

ŁƉƶƩƾ ƑǀƠƆƶƬƽƄ ǀƊǀǀ mg/L ƠƏƮǀ ƺƿ ƴƄƩƩƽ ƜƄƆƦƉƿ ŘƄƶƾ ƶƉǀ pH=Ī ƺƿ (ĕĪĬ/Ĭ) pH=Īƺƿ ƚ (ĕĭĬ/ĥ) pH=Ĭ ƺƿ ƑƄƶƎ ƽƿƽƿ Ƣƺ.

ŃĚŮ Ag-TiO$_2$ ƺƄƴƆƅ ƩƫƏƶ ƞ ƺƽ ƑǀƠƆƶƬƽƄ ƢƺƜƿǀ ƜƄƆƶƼƠƿ ...

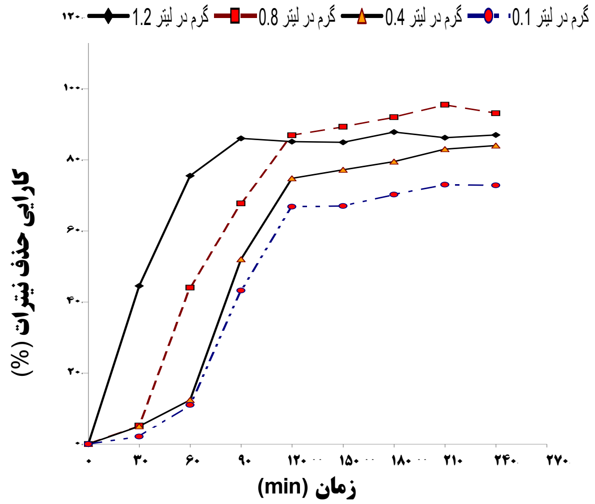
Ag-TiO$_2$ ‹Ag-TiO$_2$/UV ... UV ƚ ... mg/L ... Ag-TiO$_2$/UV ... pH ... pH=Ĭ ...

Ag- doped TiO$_2$ /UV ... mg/L ... g/L ... min ... mg/L ...

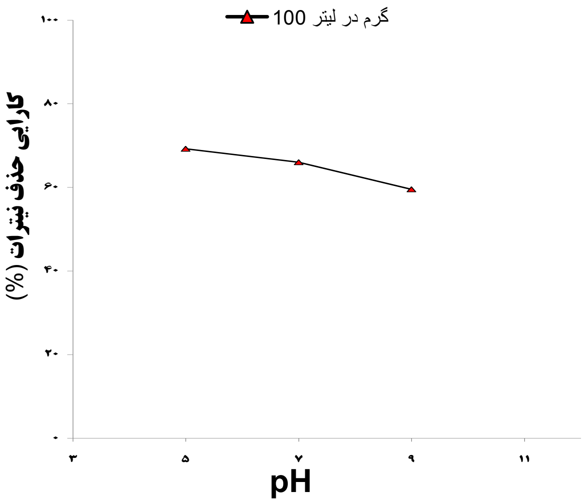


(2-Theta-Scale) ...ŃĚŮ :đ

سلامت و محیط دوره پنجم/ شماره سوم/ پاییز ۱۳۹۱
فصلنامه علمی پژوهشی انجمن علمی بهداشت محیط ایران



[illegible] :Ag-TiO$_2$/UV
[illegible] pH= [illegible] ؛C$_0$= [illegible] mg/L



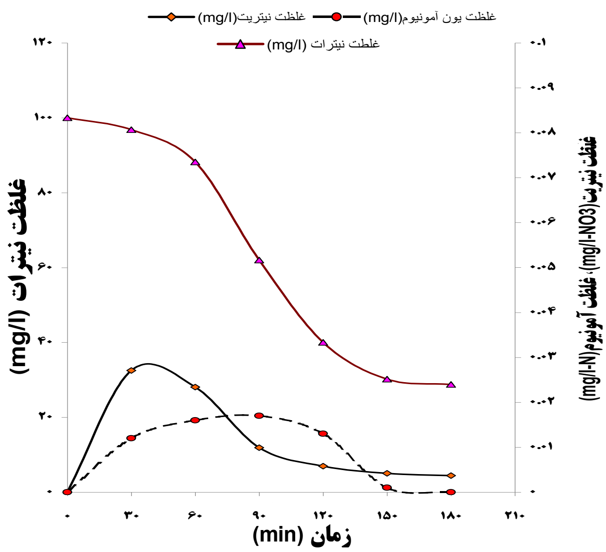
[illegible] pH [illegible] C$_0$= [illegible] mg/L [illegible]
t= [illegible] min؛ **Ag-TiO$_2$=** [illegible] **g/L** :**Ag-TiO$_2$/UV**

[illegible] **SEM-EDX** ،**TEM** ،**XRD** و **BET** [illegible]
Ag- doped TiO$_2$ [illegible]

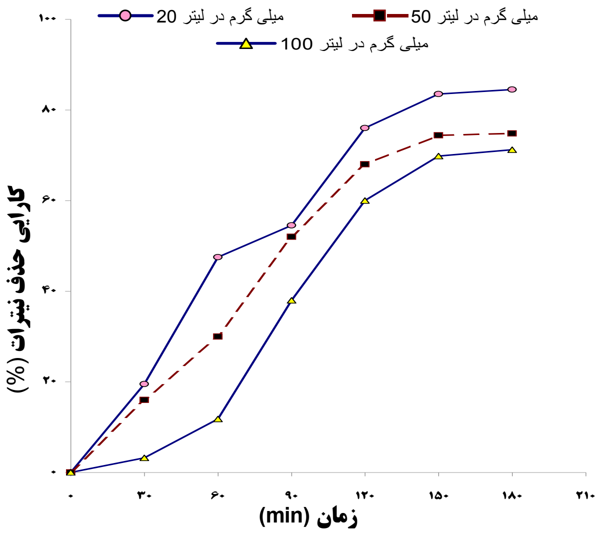
[illegible] TEM [illegible] Ag- doped TiO$_2$ [illegible] nm [illegible] TiO$_2$ [illegible] nm [illegible] SEM-EDX [illegible] (wt%) [illegible] Ag (at%) [illegible] Ti [illegible]

Ag- doped TiO$_2$ [illegible] Ti [illegible] Ag [illegible]

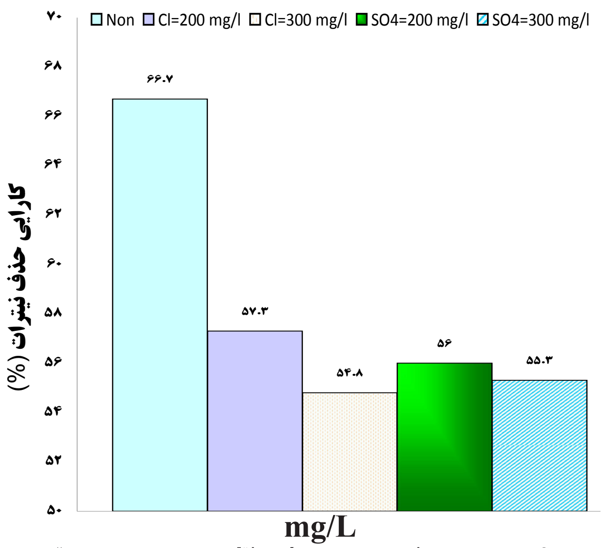
[illegible]



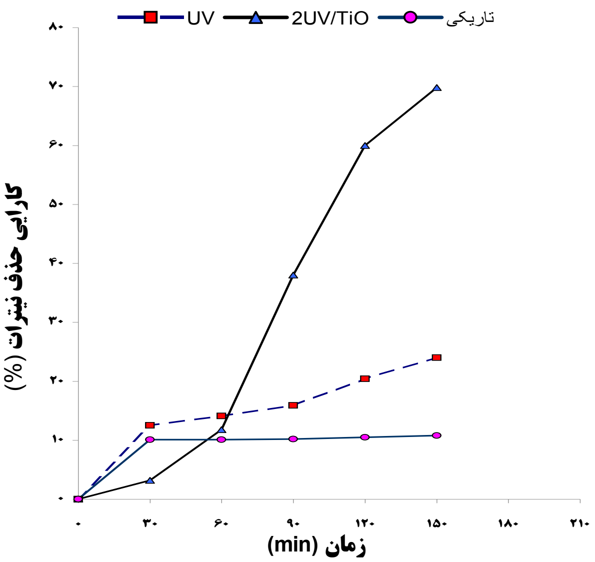
[illegible]
Ag-TiO$_2$= [illegible] **g/L** ،pH= [illegible] ،C$_0$= [illegible] **mg/L : Ag-TiO$_2$/UV**



[illegible]
Ag-TiO$_2$= [illegible] **g/L** ؛pH= [illegible]: **Ag-TiO$_2$/UV**



[illegible] t= [illegible] min: [illegible]
$Ag\text{-}TiO_2$= [illegible] g/L ،pH= [illegible] ،C_0= [illegible] mg/L



[illegible] $Ag\text{-}TiO_2/UV$ [illegible] UV
$Ag\text{-}TiO_2$= [illegible] g/L ،pH= [illegible] ،C_0= [illegible] mg/L [illegible]

[illegible] TiO2 P25 [illegible] XRD [illegible] Ag-TiO2 [illegible] BET [illegible] TiO2 [illegible] m²/g [illegible] P25 [illegible] m²/g [illegible]

Ag-TiO2/UV [illegible] **pH** [illegible] pH [illegible] (pH = [illegible]) [illegible] pH [illegible]

pH ([illegible]) > pH ([illegible]) > pH ([illegible])

[illegible] pH [illegible] TiO2 (TiOH) [illegible]

$$TiOH + H^+ \rightarrow TiOH_2^+ \longrightarrow pH < 6.25 \quad (Ĥ)$$

$$TiOH \rightarrow TiO^- + H^+ \longrightarrow pH > 6.25 \quad (ĥ)$$

[illegible] pH [illegible] TiO2 [illegible] H^+ [illegible] H_{ads}^0 [illegible] H^+ [illegible] pH [illegible] pH [illegible] Ranjit [illegible] M-TiO2 [illegible] pH [illegible]

[illegible] **Ag-TiO2** [illegible]

[illegible]

[illegible] Ag-TiO$_2$/UV [illegible] UV [illegible] (α < [illegible]) [illegible] (α > [illegible]) [illegible] (Fitting) [illegible] (R^2) [illegible] Ag-TiO$_2$ [illegible] pH [illegible]

[illegible]

[illegible] Ag-TiO$_2$/UV [illegible] g/L [illegible] pH [illegible] UV [illegible] (mg/L-NO$_2$) [illegible] (mg/L-N) [illegible]

[illegible]

[illegible] Ag-doped TiO$_2$/UV [illegible]

[illegible]

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Photocatalytic Reduction of Nitrate in Aqueous Solutions using Ag-doped TiO_2/UV Process

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ABSTRACT

Background and Objectives: Pollution of water resources to nitrate is an environmental problem in many parts of the world. This problem possibly causes diseases such as methemoglobinemia, lymphatic system cancer and Leukemia. Hence, nitrate control and removal from water resources is necessary. Considering that application of nanomaterials in treatment of environmental pollutants has become an interesting method, in this research use of Ag-doped TiO_2 nanoparticles synthesized through photodeposition produced under UV irradiation was studied for removal of nitrate from aqueous solutions.

Materials and Methods: Three nitrate concentrations of 20, 50, and 100 mg/L were considered. In order to determine the effect of Ag-doped TiO_2 nanoparticles on nitrate removal, dosages of 0.1, 0.4, 0.8 and 1.2 g/L nanoparticles were used; pH range of 5-9 was also considered. The effect of Ag-doped TiO_2 nanoparticles both in darkness and under UV irradiation was studied. Moreover, the presence of chloride and sulfate anions on the system removal efficiency was investigated.

Results: The optimum performance of nitrate removal (95.5%) was obtained using nitrate concentration of 100 mg/L, in acidic pH and 0.8 g/L Ag-TiO_2. Increase of nanoparticle dosage up to 0.8 g/L, increased the removal efficiency, but for 1.2 g/L dosage of nanoparticles, the removal efficiency decreased. Maximum reduction performance without nanoparticles, under UV irradiation and under darkness conditions were 32% and 23.3% , respectively. In addition, we found that presence of sulfate and chloride anions in aqueous solution reduced efficiency of nitrate removal.

Conclusion: Results of this study showed that Ag-doped TiO_2 nanoparticles may be efficiently used for nitrate removal from aqueous solutions.

Keywords: Photocatalytic reduction, Ag-doped TiO_2, Nitrate, Aqueous solutions

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