

Impact on textile industry Effluent on environment and there removal by Photo catalytic degradation using Different size of Titanium di oxide nanoparticle

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Abstract: Textile industries are however major consumers of water, dyes and other toxic chemicals. The effluents generated from each processing step comprise substantial quantities of unutilized resources. The effluents if discharged without prior treatment become potential sources of pollution due to their several deleterious effects on the environment. Photo catalysis is a rapidly expanding technology for wastewater treatment. In this the chemical effects of various variables on the rate of degradation of different pollutants are discussed in detail. The effects of adsorption, temperature, intensity of light, pH, and the presence of anions, cations, dissolved oxygen, BOD, COD, TDS etc. The photo catalytic degradation of water was studied using nano Titanium dioxide composite catalyst from textile wastewater. The textile effluent was characterized by various analytical procedures before treatment.

Keywords: Textile industries waste water & soil, COD, BOD, Preparation of TiO₂ Nano catalysts, Photo degradation.

I. INTRODUCTION

Environment pollution are not monitored and controlled, although they are known or suspected to cause harmful ecological effects and can be deleterious to human health. Industry effluents released produce a high degree of organic pollution in both aquatic and terrestrial ecosystems. They also alter the physical and chemical characteristics of the receiving aquatic bodies. In the present study, the effect of bacterial isolates on the reduction of physical & chemical characteristics in industries effluent was investigated. Pollution has become the biggest environmental challenge Textile polluted water contains water and increase chemical oxygen demand, Biological oxygen demand and pH value, TDS (Total Dissolved Solid), Conductivity of water and it's also affected soil fertility.

In recently years study we find out that pollution to be controlled by photo catalytic reaction in which dissolved polluted is reduce by photo degradation with the help of Nano catalyst.

II. SAMPLE COLLECTION & ANALYSIS OF SAMPLE

For analysis were collected water and soil from the study area (Industrial area, Indore)

Following standard procedures. Analysis was done in research laboratory of the department of chemistry NMV Govt. collage Hoshangabad. For testing of water sample were collected with two liters white plastic kegs, which have been thoroughly washed with nitric acid and then rinsed several times with distilled water. Analysis was carried out as per the standard methods (APHA, 1989).

We can analysis by different parameter which has shown as below:

Table 1: Parameter and their different values

	Parameters	Standard value	Sample value
1	Colour	Transparent	yellowish
2	pH	6.5-8	8.1
3	TDS	2100mg/L	16088.38
4	Basic	Absence	Alkaline nature
5	Acidity	Absence	Absence
6	Dissolved Oxygen(mg/L)	4.5-8mg/L	1.28
7	Biological Oxygen Demand(mg/L)	150mg/L	305.58mg/L
8	Chemical Oxygen Demand(mg/L)	250mg/L	1360mg/L

To analyze soil parameters Soil sample collected from agriculture land of study area. Soil sample were dried at 70oC for 24 hours in the oven. Notably, for 1gm sample, 8ml conc. HCl and 2 ml conc. HNO₃ were added and kept for overnight 3 at 35oC digestion was done according to the standard method. After dilution and filtration, the digestion solution was analyzed for determination of following parameters shown as below:

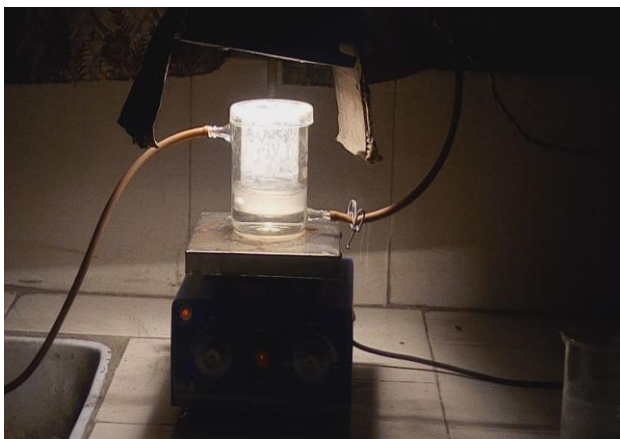
Table 2: Parameter and their different values

S.no	Parameters	Sample value	Standard value
1	pH	5.8	6.5-8.0
2	Electrical Conductivity	0.42	< 0.15

3	Colour	Black	-
4	Organic Carbon	0.20%	0.5-3.0%
5	Sulphur	27.00%	
6	Phosphorus	344.9kg/ha	134.6kg/ha 310.4kg/ha

III. EXPERIMENTAL

In Photodegradation Process we study of treatment of waste water sample with the help TiO₂nanoparticle . In this we use photo catalytic reactors which have shown as below:



From above photograph of more effective reactor and close to the real application. The reactors consist of a granulated 500cm³ Pyrex glass beaker and a magnetic stirrer on hot plate setup. The radiation source a high pressure mercury lamp. The mercury lamp was positioned perpendicular above the beaker. The mercury lamp was allowed to warm up for 3min. to ensure a stable light intensity before commencing a reaction TiO₂ (anatase&ructile) was obtain from Sigma. In all experiment firstly the value of COD (chemical oxygen demand) given sample with the help of standard ferrous ammonium sulphate (0.25N) (FAS) titration method. The value of COD of water sample 1360mg/L without photodegradation process.

$$(a-b)*N*8*1000$$

$$COD = \text{-----}$$

Amount of sample water

Where,

a = Volume of FAS for Blank water (30.6)

b = Volume of FAS for Sample water (17.0)

N = Normality of FAS (0.25N)

8 = Equivalent weight of Oxygen.

$$(30.6-17.0)*0.25*8*1000$$

$$COD = \text{-----} = 1360\text{mg/L}$$

20

From above equation COD calculated of water sample without photodegradation then value of COD is 1360mg/L, that's COD value is reduce by photodegradation process with the help of photo reactor at different concentration of sample water ,different temperature at different time interval due to which we calculated variation of value of COD.

In SET-I:In this take **30ml water sample** quantity 0.5gm TiO₂ nanoparticle this is degraded on photo reactor on **25°c temp.** For two hours on magnetic stirrer.After two hours of degradation cooling down water sample, determined the value of COD by FAS titration method then we obtain the COD value is **610mg/L.**

In SET-II: In this take **50ml water sample** quantity 0.5gm TiO₂ nanoparticle this is degraded on photo reactor on **35°c temp.** For four hours on magnetic stirrer. After four hours of degradation cooling down water sample, determined the value of COD by FAS titration method then we obtain the COD value is 260mg/L.

In SET-III: In this take **70ml water sample** quantity 0.5gm TiO₂ nanoparticle this is degraded on photo reactor on **45°c temp.** For five hours on magnetic stirrer. After five hours of degradation cooling down water sample, determined the value of COD by FAS titration method then we obtain the COD value is **160mg/L.**

In SET-IV: In this take **100ml water sample** quantity 0.5gm TiO₂ nanoparticle this is degraded on photo reactor on **55°c temp.** For five hours on magnetic stirrer. After five hours of degradation cooling down water sample, determined the value of COD by FAS titration method then we obtain the COD value is **110mg/L.**

IV. CONCLUSION

From above experiment clear that industry gets polluted water and decreases dissolved oxygen and increase COD in water bodies. The value of COD is minimizing by photodegradation by TiO₂ nanocatalyst and that Nano catalyst is used because of activity in UV light. With the help of TiO₂ catalyst we can reduce value of chemical oxygen demand in polluted water sample and it's all clear that as well as temp. and time interval is increases the value of COD in water gets decreases.

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