

PHOTOCATALYTIC OXIDATION OF OIL CONTAMINATED WATER USING TiO₂/UV

OXIDACIÓN FOTOCATALÍTICA DE DERRAMES DE ACEITE EN AGUA CON TiO₂/UV

ABSTRACT

The results of an Advanced Oxidation Process, intended to treat refractory compound polluted water, by the use of TiO₂ and UV light are presented in this investigation.

The evidence about its efficiency in hydrocarbon removal from used motor oil polluted water, since it is an extremely important pollutant due to its complexity, toxicity and recalcitrant characteristics, is presented through COD, Oil and Grease and Hydrocarbons analysis.

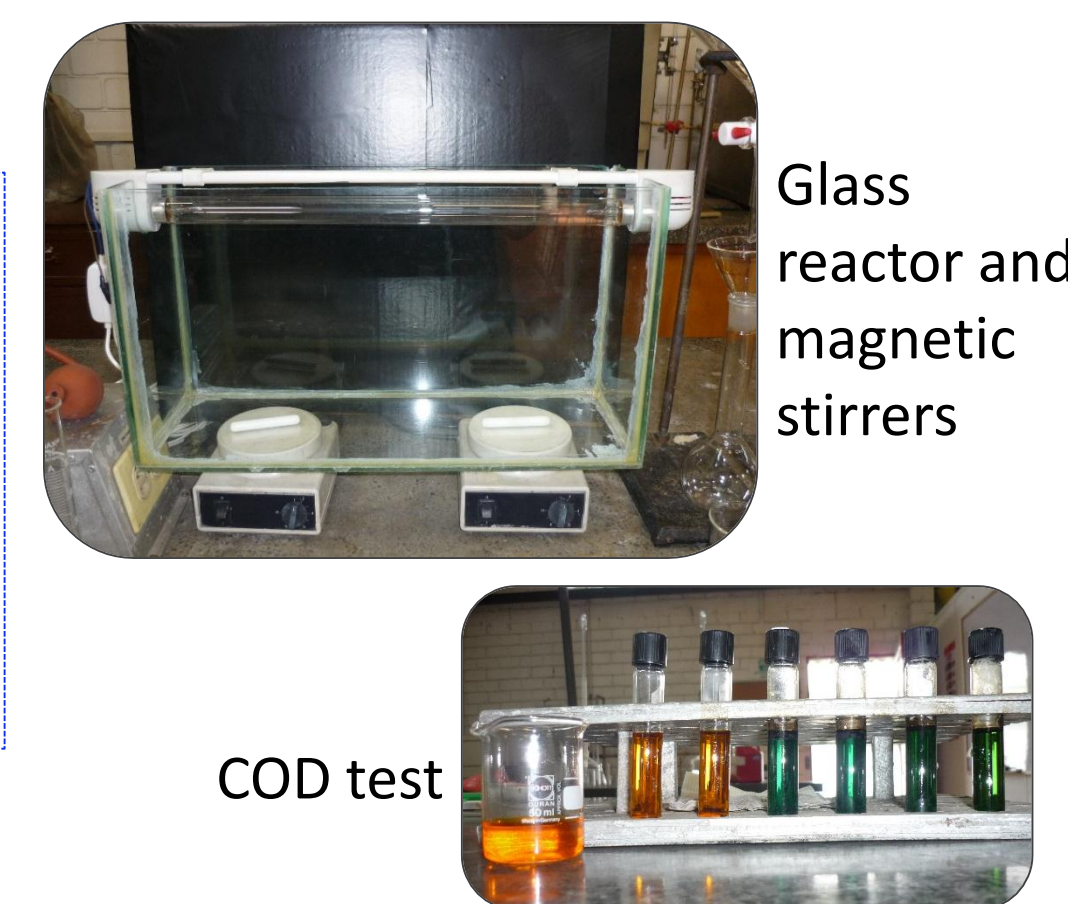
INTRODUCTION

In this research, an Advanced Oxidation Processes (AOP) review was carried out, emphasizing in the heterogeneous photocatalytic process. An experiment was done, in order to observe the viability of the method in waste water hydrocarbon removal. Specifically, the Advanced Oxidation Process with TiO₂/UV was selected to be tested as an alternative to treat used motor oil contaminated water.

METHODOLOGY

Raw Water (sample)	TiO ₂ Dose			Retention Time, θ
	0.5 g/L	1.0 g/L	2.0 g/L	
Laboratory prepared samples with 4 mL of used motor oil in four liters of distilled water (1:1000 dilution)	For each combination, three tests were done, giving a final amount of 21 test results for each control parameter.			1 hour
				4 hours

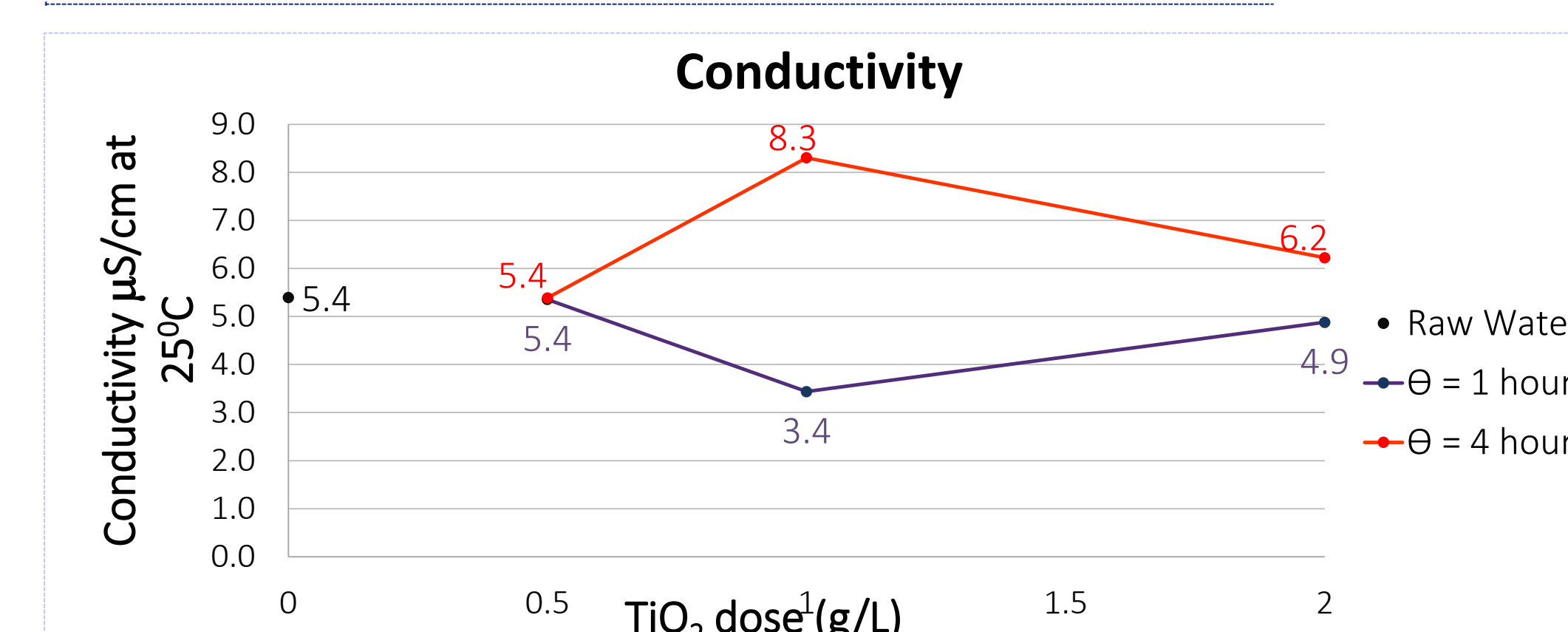
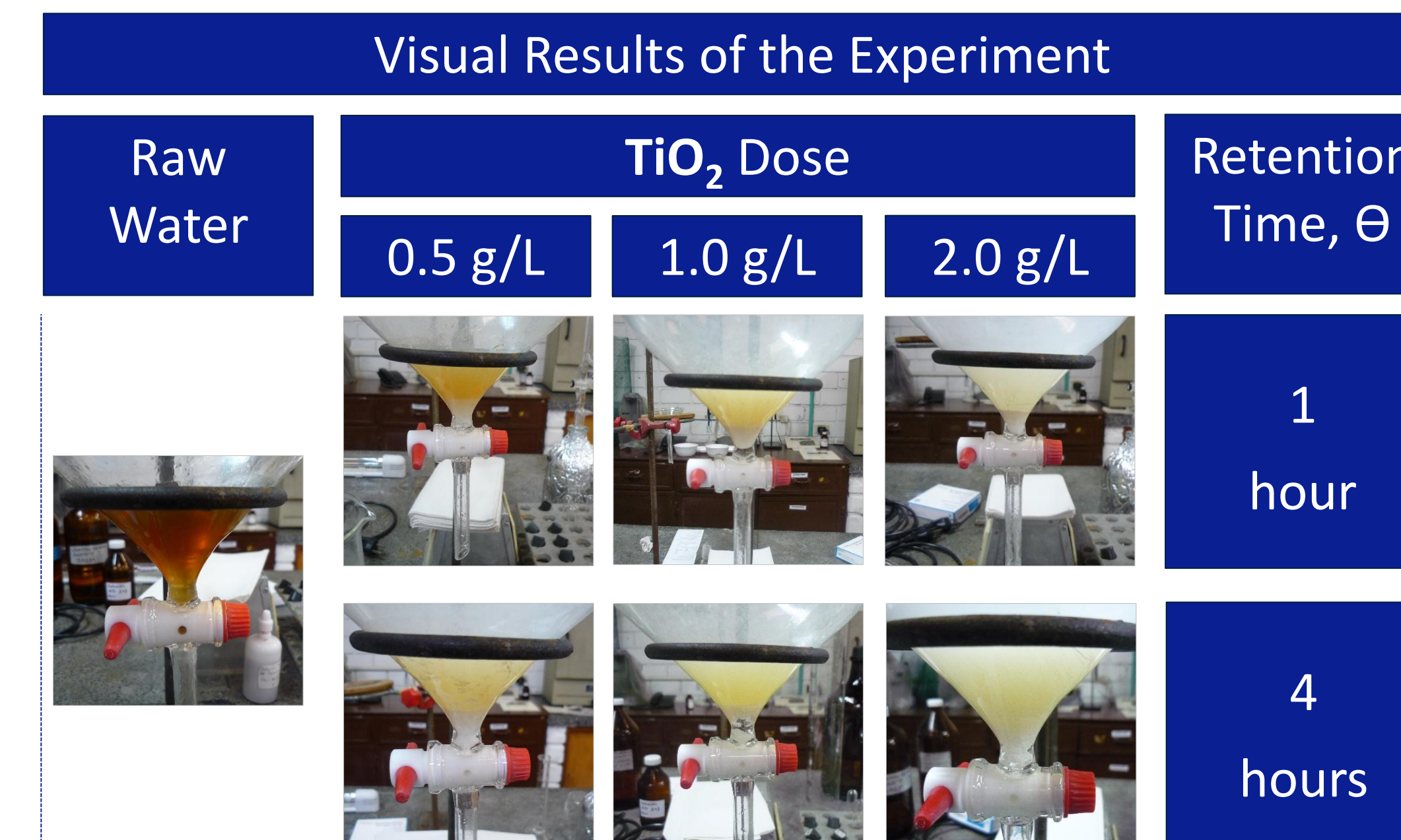
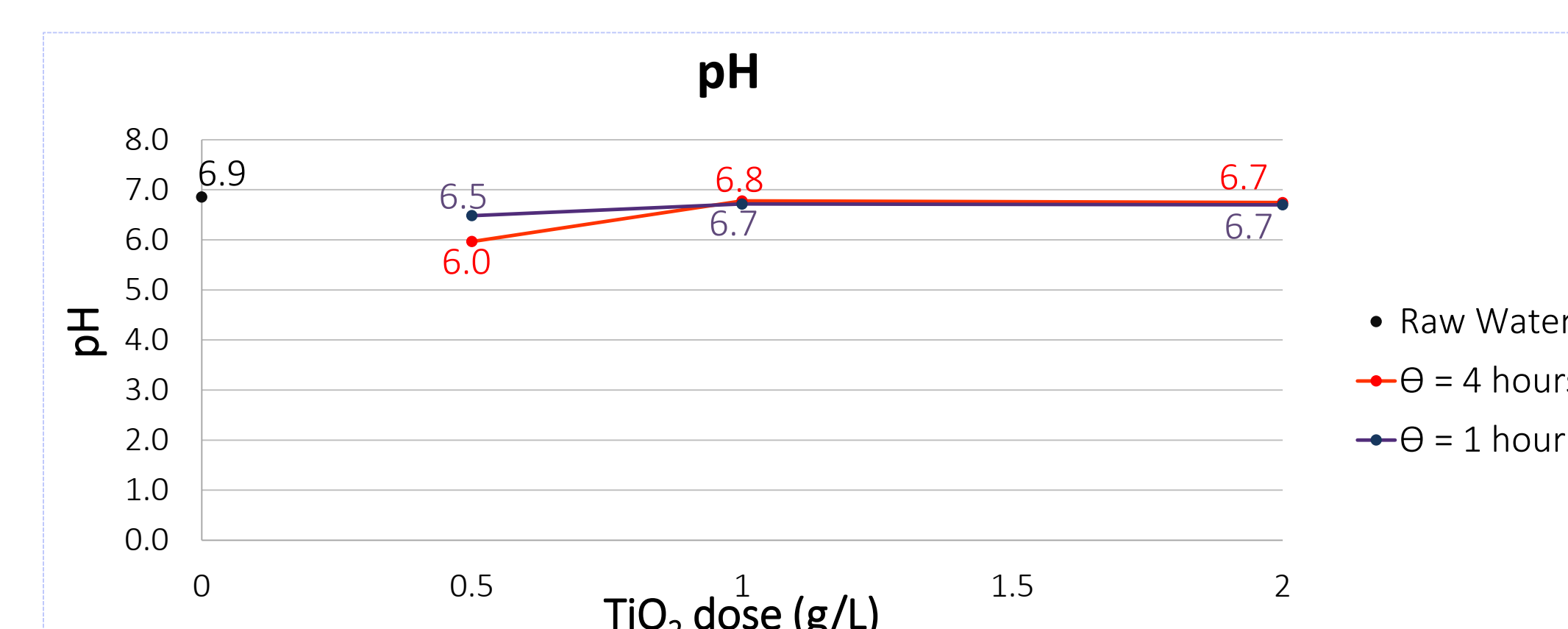
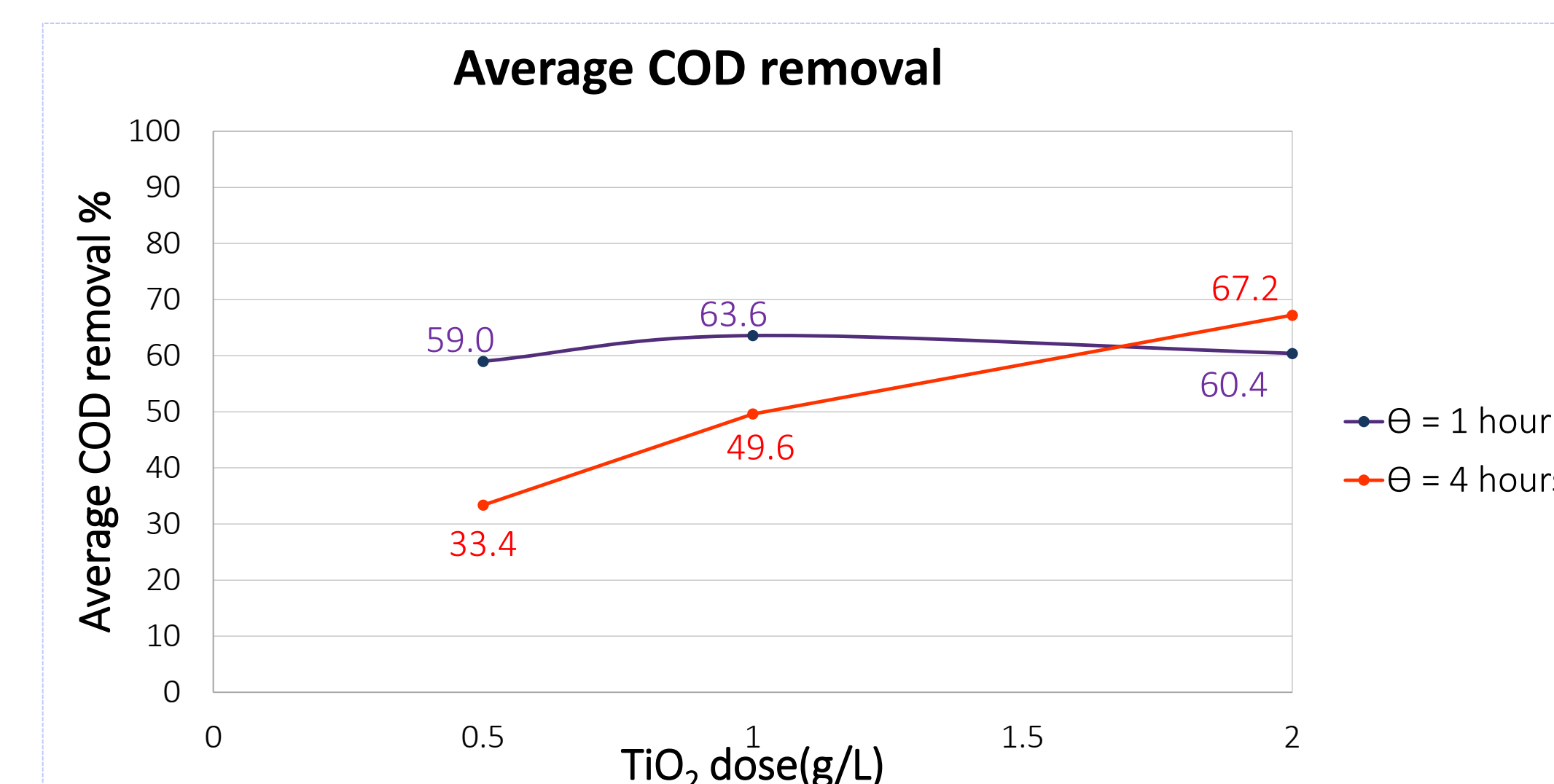
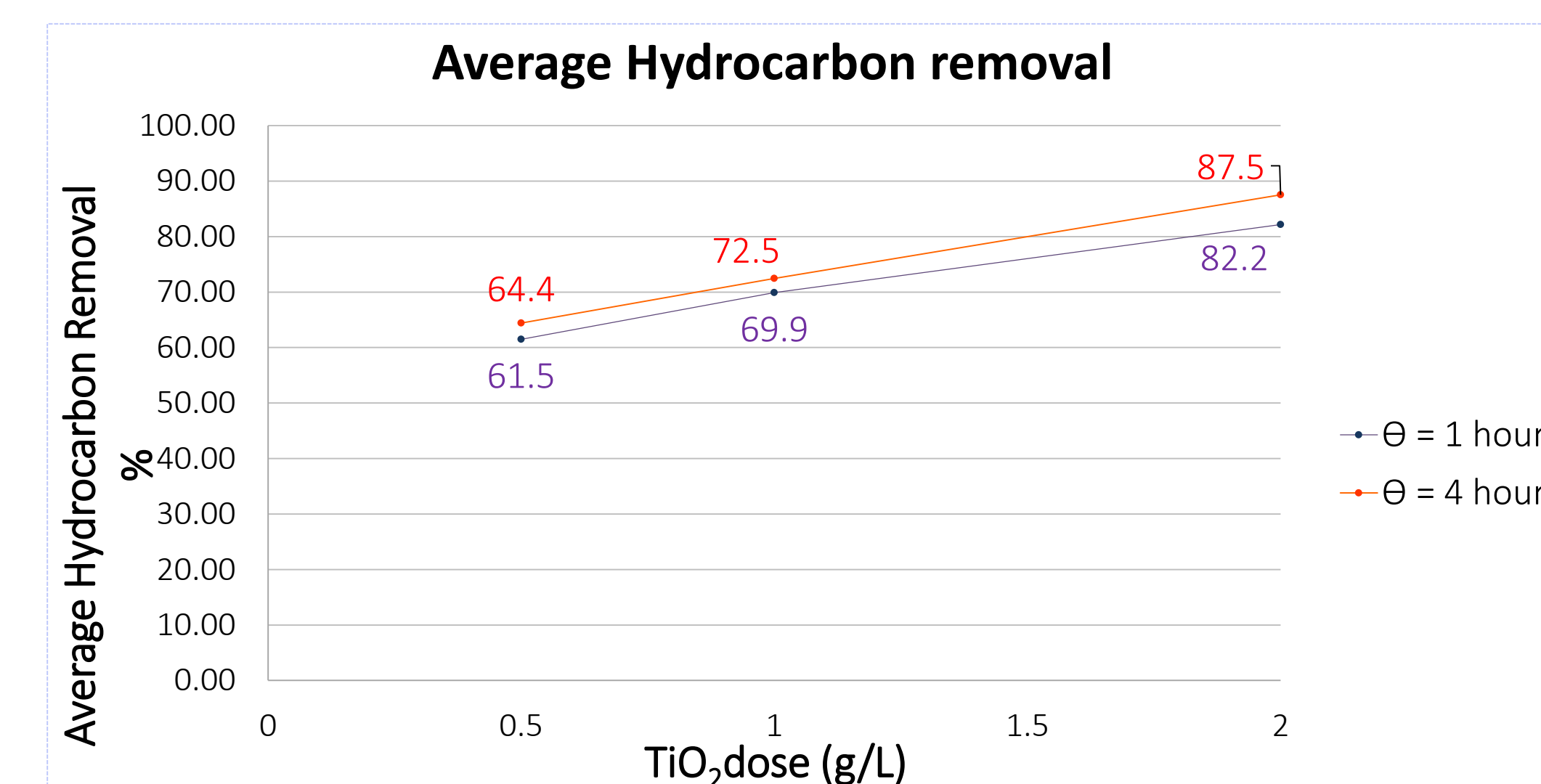
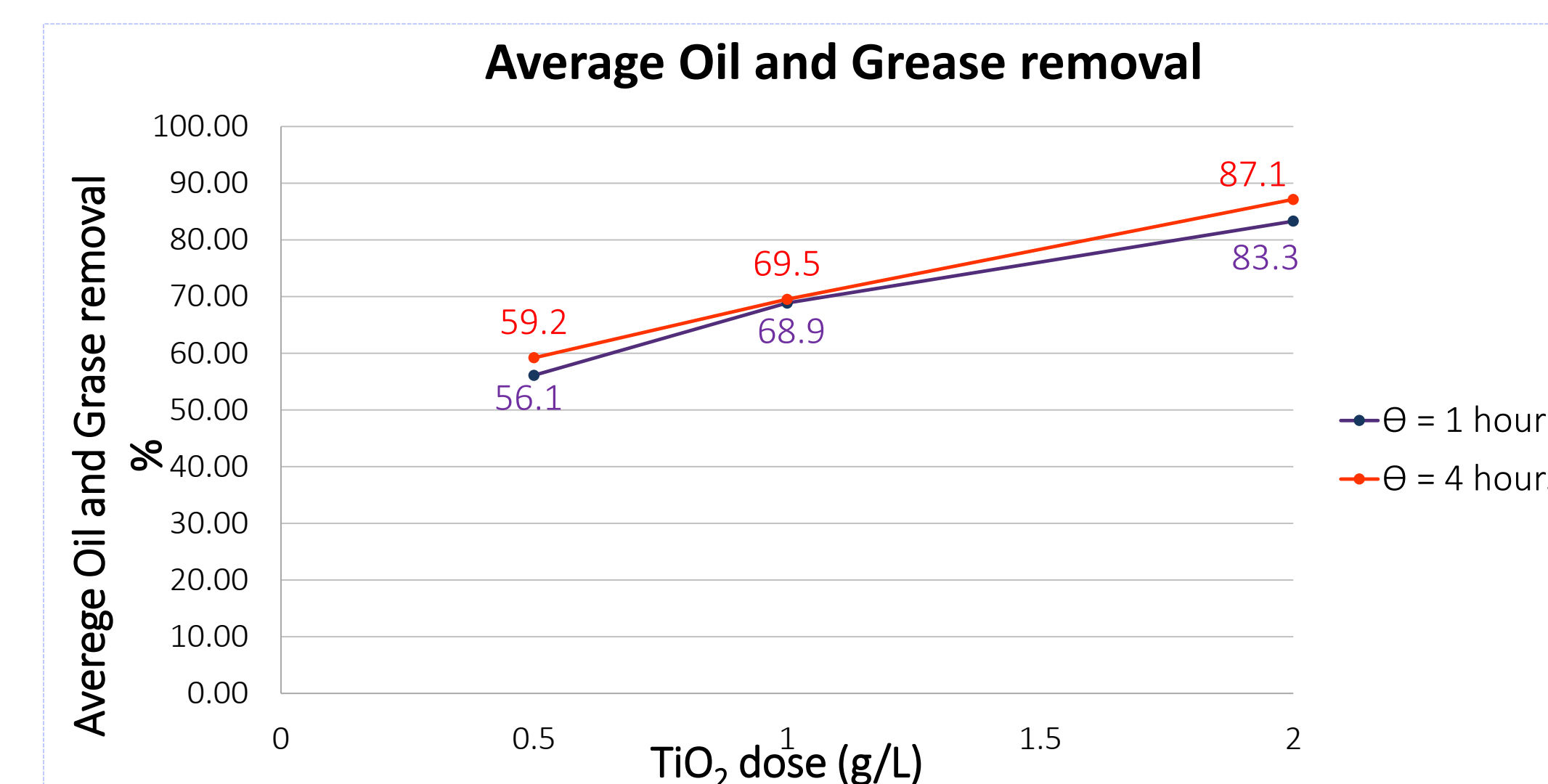
Glass vessel for batch treatment, with UV germicidal lamp (254 nm) endowed with magnetic stirrers to warrantee sample contact with Titanium Dioxide.



Control parameters (Standard Methods for the Examination of Water and Wastewater. 22nd Edition)

Chemical Oxygen demand, COD	5220C, Closed reflux, titrimetric method.
Oil and Grease	5520G, Solid-phase, partition gravimetric method
Hydrocarbons	5520F, Hydrocarbons
pH	4500-H+ B, Electrometric Method
Conductivity	2510 B, Laboratory Method

RESULTS



CONCLUSIONS

- ✓ The TiO₂ /UV heterogeneous photocatalytic process allows to obtain important removals of Oil and Grease from the sample, even with the lowest catalyst dose and retention time tested.
- ✓ By using a TiO₂ /UV process Hydrocarbon removal percentages of 60% or more can be obtained, even with the lowest catalyst dose and 1 hour retention time treatment.
- ✓ There is not noticeable difference in Oil and Grease removal according to the treatment retention time.
- ✓ The process of treatment with TiO₂/UV does not affect water pH.
- ✓ By using the photocatalytic process, COD removal of over 60% were obtained for the highest catalyst doses.
- ✓ In order to establish in detail the degradation process of used motor oil, and subsequent compound and sludge formation along the process, it is necessary to continue with this research.
- ✓ Making more tests for different retention times is recommended, in order to establish full detail of its influence in the pollutant's removal.

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