# DEVELOPING NEW ANALYTICAL METHODS FOR DETERMINATION OF SOME CHEMICALS IN DRUG FORMULATIONS AND LAB WASTEWATER WITH PROPOSAL FOR TREATMENT

Thesis presented by


## Ashgan Youssef Hashem

B.SC. (Geophysics), Faculty of Science, Suez canal University, 1999


A Thesis Submitted In Partial Fulfillment

***Of***

The Requirement of the Master Degree

***In***

Environmental Science


Department of Environmental Basic Science Institute of Environmental Studies and Research
Ain Shams University


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*Ashgan Youssef*

# Abstract

# Abstract

**Name of candidate:** Ashgan Youssef Hashem
**Title of the thesis:** Developing New Analytical Methods for Determination of Some Chemicals in Drug Formulations and Lab wastewater with Proposal for Treatment

Recent advances in analytical methods have been mirrored by our increased ability to detect and quantify organic contaminants at trace levels, or in highly complex matrix as in wastewater. Pharmaceutical compounds are generally present in parts –per- trillion or parts- per- billion levels.

Questions regarding persistence and long term adverse effects of pharmaceuticals in the environment have been raised.There are low drug concentrations in the environment that have undesirable ecological and potentially human health effects.

New, simple, rapid, accurate and sensitive methods have been suggested for determining three commonly used antidepressant drugs. They are namely; tianeptine sodium (TIA), duloxetine hydrochloride (DUL) and fluoxetine hydrochloride (FLU), respectively,in their bulk powder and pharmaceutical preparations. They are measured as well as in combination in lab wastewater.

High performance liquid chromatography (HPLC) is the most powerful and versatile instrumental technique used for detection and quantitation of TIA, DUL and FLUby using $C_8$ column, mobile phase: (sodium acetate: acetonitrile) (60:40, v/v)pH 3.85 with a flow rate: 2 ml/min at wavelength: 231 nm. The retention timeswere($t_R$= 3.016 min) for TIA, ($t_R$= 3.714 min) for DUL, and ($t_R$= 4.823 min) for FLU, respectively.

The first derivative ratio spectra was based on determination of one drug in the presence of the other to eliminate interference. The amplitude in the first derivative of the corresponding ratio spectra at 327.8nm, 252.4nm, were selected to determine TIA, and FLU, respectively, using DUL on (10 µg/ml) as divisor, and DUL showed amplitude at 255.8nm, 238.4 nm using TIA (6 µg/ml) or FLU (40 µg/ml) as devisor.

Degradation of the drugs occurred by using the advanced oxidation process presented in the preseence of titanium dioxide as a photocatalyst in the presence of UV irradiation led to destruction of the pollutants to simpler molecules.
**Key words:**Drugs, Duloxetine, Tianeptine, Fluoxetine, derivative ratio, Titanium dioxide, photocatalsis, wastewater, treatment.

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