**Ain Shams University**
**Faculty of Science**
**Chemistry Department**


# Modern Physicochemical Methods and Their Applications in Chemical Analysis for Determination of Some Important Industrial Material

**A Thesis**
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**As Partial Fulfillment for Requirements of Master of Science**
**"Chemistry Department"**
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**B.Sc. in Major Chemistry, Faculty of Science**
**Ain Shams University**
**2010**

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# Approval Sheet

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بِسْمِ اللّهِ الرَّحْمنِ الرَّحِيمِ

قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ
الْعَلِيمُ الْحَكِيمُ

صدق اللَّهُ العظيم

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# Aim of the work

The aim of the present work is the development and introduction of modern analytical techniques with high sensitivity and selectivity with low cost for the determination of some important hormones in human body such as cortisol and thyroxine to achieve this goal it's intended to

1) Synthesis and characterization of two organic photo probesin which their emission affected by hormone.
2) Studyof the absorption and emission of the photo probes and the different factors affecting in their emission such as pH ,solvent.
3) Using optimum condition for determination of cortisol and thyroxine in human body.

# Introduction

Photoluminescence is a type of optical spectroscopy in which a molecule is promoted to an electronically excited state by absorption of ultraviolet, visible, or near infrared radiation. The excited molecule then decays back to the ground state, or to a lower-lying excited electronic state, by emission of light. The emitted light is detected. Photoluminescence processes are subdivided into fluorescence and phosphorescence**[Wehry,1993]**.The key characteristic of fluorescence spectrometry is its high sensitivity.

## 1.1Photoluminescent Energy Level Diagrams

The Jablonski diagram that drawn below is a partial energy diagram that represents the energy of photoluminscent molecule in its different energy states. The lowest and darkest horizontal line represents the ground-state electronic energy of the molecule which is the singlet state labeled as $S_0$. At room temperature, majority of the molecules in a solution are in this state.

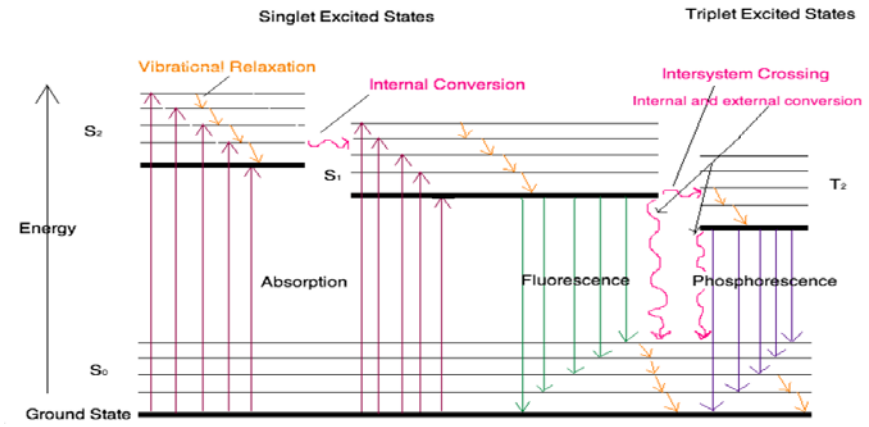


***Figure 1.1.Partial Jablonski Diagram for Absorption, Fluorescence, and Phosphorescence***

The upper lines represent the energy state of the three excited electronic states: $S_1$ and $S_2$ represent the electronic singlet state (left) and $T_1$ represents the first electronic triplet state (right). The upper darkest line represents the ground vibrational state of the three excited electronic state. The energy of the triplet state is lower than the energy of the corresponding singlet state.

There are numerous vibrational levels that can be associated with each electronic state as denoted by the thinner lines. Absorption transitions can occur from the ground singlet electronic state ($S_0$) to various vibrational levels in the singlet excited vibrational states. It is unlikely that a transition from the ground singlet