




المستوى الثانى

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	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	EXAMINATION FOR SECOND YEAR STUDENTS. (DOUBLE MAJOR PROGRAMS)		
COURSE TITLE:	INSTRUMENTAL ANALYSIS (1)	COURSE CODE: CH2244	
DATE: JUNE 3, 2017	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Question (1): Chose the correct answer for the following: [20 marks]

- The radiative $T_1 \rightarrow S_0$ process is....., while radiationless $S_1 \rightarrow T_1$ process is.....**
i) an internal conversion ii) an intersystem crossing iii) an absorption
iv) a phosphorescence v) a fluorescence.
- In atomic absorption spectroscopy, which of the following statements is FALSE?**
i) Flame is used to excite the element to a higher energy state.
ii) A hollow-cathode lamp with a cathode made of the element to be analyzed is used to produce a wavelength of light specific for the material.
iii) This light is absorbed by the ground state atoms in the flame.
iv) There is a net decrease in the intensity of the beam.
- The term (I/I_0) is called.....**
i) absorbance ii) opacity iii) extinction coefficient iv) transmittance
- What is the main light source used in fluorescence spectrometer?**
i) deuterium lamp ii) xenon lamp iii) hollow cathode tube iv) tungsten lamp
- The atomization processes in flame atomic absorption spectrometer occurs in.....**
i) photomultiplier tube ii) atomizer iii) nebulizer iv) flame
- In UV-VIS absorption spectroscopy, the UV absorption causes.....**
i) change of nuclear spin ii) change of electron distribution in valance shell
iii) change of configuration iv) change of electron distribution in inner shells
- In the atomic absorption spectroscopy, the combustion gas in the air-acetylene flame is.....**
i) air ii) nitrous oxide iii) acetylene iv) oxygen
- Which of the following is not active in IR absorption spectroscopy?**
i) Cl_2 ii) $CHCl_3$ iii) CH_4 iv) C_6H_6
- Hydrogen lamp gives a continuum spectrum in the**
i) IR region ii) UV region iii) Visible region iv) UV and visible regions
- What does the notation $n \rightarrow \sigma^*$ mean?**
i) Absorption; transition from a quantum level n to σ^* MO.
ii) Absorption; transition from a non-bonding MO to σ^* MO.
iii) Emission; transition from a quantum level n to σ^* MO.
iv) Emission; transition from a non-bonding MO to σ^* MO.

Question (2):

A. Answer the following:

[20 marks]

1. Illustrate with drawing the "Jablonsky diagram" and define the different processes of dissipating energy.
2. Draw a block diagram and steps of atomization in the flame of atomic absorption spectrometer.
3. Describe two light sources used for UV-VIS spectrophotometry.

B. Mark (✓) or (X) and give the reasons for each:

[10 marks]

1. The cells used for measuring VIS absorption spectra are made of quartz or glass.
2. Potassium bromide technique is used for measuring IR spectrum of solid sample.
3. Internal conversion is a radiative process from excited singlet to ground states.
4. Spectra of oxygen molecule can be recorded by Infrared spectrometer.
5. Unknown concentration of saturated hydrocarbons can be determined by UV spectrometers.

Question (3): Write short notes on each of the followings:

[20 marks]

1. Two applications of UV-VIS spectrophotometry.
2. Write the mathematical expression for fluorescence intensity and concentration at very low concentration, define each term, why the fluorescence intensity decreases at high concentrations?
3. IR principles and modes of vibration.
4. Deviation from Beer law due to chemical deviation.

Question (4):

A. Describe what it does and how it works:

[10 marks]

1. Photomultiplier tube.
2. Hollow cathode lamp.

B. Compare between each of the following:

[20 marks]

1. Electronic transition in organic and inorganic compounds.
2. Standard addition method and calibration method in photometric application of electronic absorption spectroscopy.
3. Nernst glower and Glycer lamp.
4. Potassium bromide and Nujol technique techniques in IR measurement.

Best Wishes and Good luck

Examiners	Prof. Dr. Ahmed Rehab Dr. Nagy Labieb Kamal
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