**Salahaddin University-Erbil Midterm Examination Instrumental analysis**

**College of Education 2022 4th year students**

**Chemistry department 1.5 hs**

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**Q1/ Choose the best correct answer: [ 20marks]**

**a**. Chemical reactions using synthetic compounds and usually involving a highly oxidized species such as a peroxide are commonly termed -------.

(1) Chemiluminescent. **,** (2) Fluorescence , (3) Phosphorescence

**b.** Light-emitting reactions which take place by the use of electrical current are -------reaction

(1) bioluminescent. , (2) electrochemiluminescent. , (3) chemiluminescent

**c.** The advantage of Chemiluminescentare **-------**

(1) we need monochromator but we no need excitation source

(2 ) we need excitation source but we no need monochromator

(3 we no need both of monochromator and monochromator

**d.** Add between 0.2 % of ------- to samples and standards as acures for chemical interferences.

 a) CCl4 , b) LaCl3 , c) LaPO4

**Q2/ Fill the blanks with suitable.** **[ 26 marks]**

1. Photoluminescence processes are subdivided into ----------- and ----------------.
2. Most intensely fluorescent organic molecules contain large ------------ systems.
3. In a fluorimeter instruments two -----------'s are used to select the appropriate wavelengths for ---------- and ------------. The detector is placed at -------------- to the incident light path, so that fluorescence, which is emitted in all directions, falls on the ----------- but no incident light is detected.
4. In electrothermal atomization, the samples are placed in --------- which is heated -------
5. Fluorimetry is not generally useful for molecular -------------.
6. Phosphorescence radiative transition between states of*---------*, usually from the lowest vibrational level of the lowest excited ---------state, T1 (v = 0).

**Q3/** From the following data calculate the concentration of chloride by quenching of fluorescence methodusingStern- Volmerequation. **[14 marks]**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Conc. [Cl-] M** | **0** | **0.01** | **0.02** | **0.04** | **0.06** | **0.08** | **sample** |
| **Fluo. intensity** | **100** | **30.05** | **20.7** | **11** | **6.7** | **5.4** | **27.7** |

**Q4/** Why fluorometry is more selective than UV/Vis. – spectrometry? **[19 marks]**

**Q5/** From the following schematic diagram choose a letter to each type which represented by number labeled on the diagram **for example (5 - a )** **: [ 21marks]**

1. **The schematic processes for the Jablonski diagram**:



**(a) Intersystem crossing (b) Absorption**

**(c) Phosphorescence (d) Vibrational relaxation**

**(e) Internal and external conversion**

**(f) Singlet excited state**

**(g) Fluorescence (h) Vibrational relaxation**

**(i) Internal conversion**

**B- The following schematic diagram is a F-AAS design:**

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**(a) Chopper (b) Photomultiplier tube**

**(c) Monochromator (d) Flame**

**(e) Exit slit (f) Hallow cathode lamp**

 **(g) Concave mirrors (h) Entrance slit**

**(i) Half-silvered mirror (j) Grating**

**(k) Deuterium Lamp (l) Tungsten Lamp**

