Assiut University
Faculty of Science
Chemistry Department

Date: 21 May 2019
Time: 2 hours
50 Marks

Final Exam of Petrochemicals (409chem) For 4th Industrial Chemistry Students

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Answer the following questions:

Question 1: (12.5 Marks)

I-Write short notes using equations on TWO ONLY of the following:

a) Chemicals based on ethylene oxide.
b) Wacker process for synthesis of acetaldehyde.
c) Synthesis and uses of KA oil.

II- Discuss the synthesis and applications of chloromethanes. Illustrate your answer by equations.

Question 2: (12.5 Marks)

I- Compare between TWO ONLY of the following pairs:

a) Andrussaw and Degussa processes.
b) Block and alternating copolymers.
c) Hydration of ethylene and propene.

II- Outline the mechanistic steps of Aldol Condensation of acetaldehyde for synthesis of n-butanol.

Question 3: (12.5 Marks)

I- Explain briefly using equations TWO ONLY of the following:

a) Addition of acetic acid to propene.
b) Isomerization of 1-butene in acidic medium.
c) Oxidative coupling of toluene followed by disproportionation.

II- Describe the mechanism of methanol production from Syn Gas over heterogeneous catalyst.

Question 4: (12.5 Marks)

I- Give an account for TWO ONLY of the following:

a) Usage of Linear alkyl benzenes (LAB) in synthesis of anionic detergents.
b) Synthesis of 1,4-adiponitrile and its industrial importance.
c) MTBE and TAME (Tertiary Amyl Methyl Ether) synthesis and their applications.

With My Best Wishes

Examiner: Dr/ Remon M. Zaki

Assiut University
Faculty of Science
Chemistry Department

Second semester (2018/2019)
Time: 2hrs

Final Exam For 3rd Year Students (Industrial Chemistry Programme Students-Cosmetics and Fragrance (C-414))

Answer the following questions:

I. First question (25 Marks)

1- Enzymology is a new research area in dermatology and cosmetics that tries to discover how enzymes can improve skin appearance and prevent skin problems.

In the light of the above sentence explain briefly **three only** from the followings:

a) The factors which affect the enzyme activity.
b) Forces hold tertiary and quaternary structures of the enzymes.
c) The importance of the Co-factors for enzymes activity.
d) Competitive inhibitors and non-competitive inhibitors

2- Compare between the following pairs:

a) X-ray and NMR techniques for 3D protein structure determination.
b) RIFM and IFRA roles in the regulation process of the perfumes industry.

3- Explain the signal generation process of odorant molecules?

II. Second question (25 Marks)

Answer **five only** from the following questions

1- Discuss the ligand–olfactory receptor modelling importance for the future of the fragrance industry?

2- Discuss the advantages and disadvantages of the bacterial expression system for protein production?

-Look at the back-

3- Explain briefly the role of GC chromatography as a powerful analytical tool in the fragrance industry?

4- Explain the principles of ion-exchange chromatography for protein purification?

5- Explain the reproductive effect of phenylethyl alcohol (PEA) which is one of the major components of the perfumery industry?

6- Discuss the combinatorial nature of odour perception?

Good luck

Dr. Ahmed Mahmoud Sayed

Assiut University

Faculty of Science
Chemistry Department

Final Examination for B.Sc. (Chemistry major)
Applied Organic Chemistry (412 C): (Textiles& Dyes & Polymers &Material science)

Date: Sunday, 26/05/2019 Time: 2 hours

Answer the following Two Sections:

Section A: (Textiles and Dyes Chemistry) : **(25 points)**

Answer Five Only from the following:

1) Classify and Draw the chemical structures for the synthetic Dyes according to the type of chromophores present ?
2) Explain the main Difference between Dyes & Inorganic Pigments
3) Discuss briefly the Relation between Color and constitution ?
4) Mention the : Advantages, Disadvantages, Uses and Care for:
   i) Cotton ii) Wool iii) Silk iv) Acrylic v) Polyesters
5) What is the significance of fiber evidence? How can using the fibers to reconstruct crime scenes ?
6) Explain what are the main tests for the identification of Fibers?

Section B : (Polymers &Material Science) **(25 Points)**

Answer the following questions:

1) Is it possible to make polyethylene from cyclohexane? If not, say why? then show examples of ring opening polymerization?
2) Discuss with examples the types of Initiators, and what you mean by HIPS ?
3) Compare between the step- and chain- growth polymerization, and also compare, giving reason, between the time needed in polymerization of theses monomers: (Vinyl Chloride, Styrene , MMA).
4) Explain by (equations or structures): Types of copolymers- Backbiting- Dianion, Self initiator.
5) Complete the following table:

Polymer	Abbreviation	Structural formula of monomer	Structural formula of polymer	Uses
Polymethylmetha-acrylate	(i)	(ii)	(iii)	(iv)
Polyvinyl chloride	(v)	(vi)	(vii)	(viii)
Polypropylene	(ix)	(x)	(xi)	(xii)

Good Luck

Examiner:

Prof. Dr. Kamal Ibrahim Aly

Assiut university Faculty of science Chemistry department	Final exam Time: 2 hours Unit process in fertilizer industry	Industrial chemistry Fourth level (400 Eng)

First question **(25 degrees)**

A burning furnace in fertilizer factory consumes 20 ton per day sulfur. Its dimensions are 12 m length and outer diameter 3 m. lining thickness is 25 cm with thermal conductivity 0.02 watt/K.m. Temperature of exhausted gases is 1000°C.

- Calculate the excess air ratio.
- Calculate the final composition of exhausted gases.

If, $S_{(s)} + O_{2(g)} = SO_{2(g)}$ $\Delta G^o = -75 + 0.003T$ kCal/mole

$C_{p_{N_2}} = 7$ Cal/mole. K, $C_{p_{O_2}} = 7.12$ Cal/mole. K

Second question **(15 degrees)**

For producing MAP fertilizer needs to react ammonia with phosphoric acid (50 %) at 110°C.

- Calculate the amount of moisture in the final product.

If, $NH_{3(g)} + H_3PO_{4(l)} = NH_4H_2PO_{4(s)}$ $\Delta G^o = -138 + 0.25T$ kJ/mole

$C_{p_{H_2O_l}} = 45$ Cal/mole. K, $C_{p_{H_2O_g}} = 6.8$ Cal/mole. K,

$\Delta H_{H_2O_{eva}} = 125$ J/mole

Third question **(10 degrees)**

A heat exchanger used for cooling sulfur dioxide with rate 10 m^3/hour from 1000 to 600°C. The water charges at room temperature and outlet at 99°C.

- Calculate the amount of water.

If, $C_{p_{H_2O_l}} = 45$ Cal/mole. K, $C_{p_{SO_{2g}}} = 6.5$ Cal/mole. K,

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Good Luck

Dr. Eng.\ Ahmed Dawood

Assiut University

Faculty of Science
Chemistry Department

Surface chemistry & Electrochemistry for 4th Level Students (Chem.432)
Chemistry Major
June 2019
Time :3 h

Answer the Following Questions:

Section 1

Surface chemistry (33 Marks)

(A) Complete the following sentences: (3 Marks)

i) Slip motion many times is ..... for plasticity of crystals.

ii) Anion vacancy with trapped electron is .....

iii) Interstitial atom occupies ..... position in crystal lattice.

iv) Paramagnetic results from a permanent .....

v) Addition of cation with higher valence into ionic solid with lower valence creates .....

vi) If the refection of all lattice positions through a point brings a coincidence of points, there is a .....

(B) Short answer questions (10 Marks)

1- Give the mathematical equation relating the pressure and the extent of adsorption (x/m) of gas on solid.

2- Effect of Li^+ ions doping on the electrical conductivity of NiO and ZnO.

3- What are the effects of temperature and pressure on physical and chemical adsorption.

4- What is the meaning of catalyst (A) is more active and selective than catalyst (B).

5- What is impregnation method.

(C) Answer **four only** from following questions: (20 Marks)

1- Deduce an empirical law that be used for calculating the average area occupied by each molecule adsorbed on the surface in oil/ water system.

2- Discuss the electrical properties of semiconductors.

3- Explain the groups of catalysis theories.

4- Apply the BET method for calculation of specific surface area (S_{BET}) of a solid catalyst from adsorption isotherm.

5- Explain the importance of catalyst supports taking in your consideration the characteristic properties of a support and why alumina is used industrially support.

أنظر خلفه

Section 2

Electrochemistry (Marks = 17)

Answer only three questions from the following:

Q1) Complete the following:

(i) The fermi energy is defining as the electrochemical potential of ..... and determine their ..... the interface.

(ii) Electrolyte is ..... conductor, while metal is ..... conductor.

(iii) Activity is the ..... of ions depending on ..... in solution.

(iv) Inorganic crystals in which a small ion can move are known as.....

(v) Polarizable electrode: the electrode in which .....

Q2) Starting with the first law of thermodynamic and using fundamental thermodynamic relations, prove that measurement of electrochemical cell potential is directly calculated the free energy of the process.

Q3) i) Write short note on: Pitting corrosion – Inhibitors

ii) Explain by chemical equations the corrosion of iron in an aqueous acidic solution in absence and presence of oxygen.

Q4) Describe the energy profile of electrode reaction $Ag^{+}_{(aq)} + e^{-} = Ag_{(s)}$ in absence and in applying of $\Delta\Phi$ potential to reduction process. Estimate the electrochemical rate equation for this electrode reaction.

(Good Luck)

Prof. Dr. Abdel-Aziz A. Said , Prof. Dr. Abou-El- Hagag A. Hermas

Assiut University

Faculty of Science

Chemistry Department

June, 2019

Time: 3 hrs

Final Examination of Selected Topics in Analytical Chemistry (C-444)

Section (A) (17 marks)

I) Answer the following questions: (5 marks)

1- Write briefly on; UV disinfection.

2- ClO_2 levels in water can be determined by iodometric titration.

$$ClO_2 + 5\,I^- + 4\,H^+ \rightarrow 5/2\,I_2 + Cl^- + 2H_2O$$

A 200.0 mL sample of water is treated with acidified KI and the liberated I_2 is titrated with $Na_2S_2O_3$ solution.

$$I_2 + 2\,Na_2S_2O_3 \rightarrow 2\,NaI + Na_2S_4O_6$$

If 9.66 mL of 4.26×10^{-3} M $Na_2S_2O_3$ solution are required to react with all liberated I_2, calculate the concentration of ClO_2 in the water, in ppm units. (At.wts; O = 16, Cl = 35.5)

II) Answer <u>Only Four</u> of the following questions: (12 marks)

1- Define the following:
   i) Solvent extraction.
   ii) Distribution coefficient.
   iii) Distribution ratio.

2- Derive an expression for the percent extracted of a solute.

3- Discuss the effect of the pH and of the reagent concentration on the solvent extraction of metal chelates.

4- The distribution ratio between 3 M HCl and tri-n-butyiphosphate for $PdCl_2$ is 2.3, what percent of $PdCl_2$will be extracted from 25.0 mL of a 7.0×10^{-4} M solution into 10.0 mL tri-n-butyiphosphate?

5- For a solute with a distribution ratio of 25.0, show by calculation which is more effective, extraction of 10.0 mL of an aqueous solution with 10.0 mL organic solvent or extraction with two separate 5.0 mL portions of the organic solvent?

أنظر خلفه باقي الأسئلة

Section (B) (16 marks)

Answer Only Four of the following questions:

1- Illustrate the scheme proposed for secnidazole drug reacting with sodium nitrite in the presence of hydrochloric acid. Describe the reaction involving the mechanism between diazotized drug and α-naphthyl amine as a coupling agent to form the azo product.

2- Describe a spectrophotometric method for the determination of Doxepin drug using Titanium thiocyanate in an acidic medium.

3- Describe a spectrophotometric method (involving the mechanism) for the determination of dopamine drug through the complexation of dopa-semiquinone with Ni(II) ions.

4- Suggest a spectrophotometric method for the detection of Fluoroquinolone antibacterial (Ciprofloxacin) drug by forming binary complex between the drug and Eosin Y dye.

5- Describe the scheme proposed for the detection of Desloratidine drug using Quinalizarine in a polar solvent.

Section (C) (17 marks)

I) Answer the following question:

1. **Define each of the following terms:** **(5 marks)**

   i) Self-quenching ii) Photochemical decay iii) Coulometry

   iv) Equivalent conductance v) Conductometric titration

II) Answer Only Three of the following questions: **(12 marks)**

1. Discuss the effect of turbidity and temperature on fluorescence measurements.
2. Write on the spectrofluorimetric determination of certain antidepressant drugs in human plasma.
3. How long a constant current of 100 mA should be passed through a solution to prepare 100 ml of a solution of 0.01 M Ni^{2+} using an anode of pure nickel?
4. Write on the conductometric titration of a weak acid with a strong base.

Good luck

Examiners:
Prof. Dr. Hassan Sedaira
Dr. Ahmed M. Kamal
Dr. Doaa Abdel-Rahman

Faculty of Science
Assiut University
Chemistry Department

Time: 3 hrs
June 2019

Final Exam: Inorganic Chemistry 4th level (C-422)

Answer the following questions:

1-A) Put (√) or (X) in front of each of the following: **(10 marks)**

i) Inert complexes are thermodynamically stable ( ).
ii) Complexes of trivalent f-block metal ions are inert ( ).
iii) Most stable complexes are those of soft Lewis acids and hard Lewis bases ( )
iv) Hard ions or molecules have a large HOMO- LUMO separation. ( )
v) Steric crowding at the center of the reaction inhibits the associative reaction( ).
vi) Lower $\pi*$ electron density on the central metal ion facilitates dissociative substitution reactions. ( )
vii) Substitution in square planar $[Ni(CN)_4]$ takes place through intimate mechanism.( )
viii) The increase of coordination number in a dissociative reaction relieves the crowding in the activated complex.( )
ix) A ligand for which K_f is small is that binds to the metal ion less strongly than H_2O.( )
x) The greater the overlap between metal and ligand orbitals the stronger is the trans effect .( ).

1-B) Answer only **One** of the following: **(2.5 marks)**

(i) Define the nucleophilic discrimination factor and write the equation relates it to the order of reaction.
(ii) The role of spectator ligand in the substitution of square planar complexes.

2 –A) Complete the following with the correct choice (between brackets) **(10 marks)**

i) For determination of stability constants in solution.....independent concentration measurements are needed. (n, n+1, n+2)
ii) Soft Lewis base ligands have .... proton affinity. (very high – very small)
iii) The nucleophilic discrimination factor characterizes the sensitivity of the rate constant to .....of the ligand.(size – nucleophilicity- polarizability)
iv) Strong field $3d^3$ and $3d^6$ complexes are generally .....(inert- labile).
v) In interchange substitution mechanism, the entering and leaving groups exchange .....formation of an activated complex. (with - without)
vi) Associative intimate mechanism is.....to the change of entering group in square planar substitution. (insensitive – sensitive)
vii) Chelate formation reactions have more.....entropy than the nonchelate ones (negative- positive)
viii) Proton –sponge ligands can form stable complexes with the .... series d-metal ions. (early – late)
ix) Substitution reactions of non-labile Pt(II) and Pd(II) complexes are ..... reactions. (associative- dissociative)
x) The faster the reaction of a Lewis acid with an entering group, the ..... is the electrophilicity of the acid. (greater – smaller)

بقية الاسئلة بالخلف

2-B) Derive the equation for calculating the average number of ligand molecules attached to the metal ion (n) from pH-measurements. **(2.5 marks)**

3- A) Write briefly on **Two** only of the following:

(a) Steric effect. **(4 marks)**

(b) Trends in successive formation constants. **(4 marks)**

(c) Class A and class B metals according to the Chatt- Ahrland generalization for stability correlations. **(4 marks)**

(B) Prove that M-NO bond appears to be more stronger than M-CO bondin the chemical since **(4.5 marks)**

4- Express the following points using chemical equations:

(i) Using Gringard reagentto get organometallic compound. **(6.5 marks)**

(ii) Prepare metal carbonyl compound in presence additional reducing agent. **(6 marks)**

GOOD LUCK

أ.د. سحر الجيار -أ.د. سعيد ابراهيم

Assiut University
Faculty of Science
Chemistry Department

June:2019
Times: 2 hrs

Final Examination of Wastewater Treatment (Chem410)

Students: 4th Level

Write on the following:

1- Discuss the principles of the treatment of wastewater. **(20 Marks)**

2- a) Determination of dissolved oxygen in water. **(8 Marks)**

b) Alkalinity of a water sample. **(7 Marks)**

3- Write briefly on a typical water treatment program. **(15 Marks)**

Examiner: Prof. Dr. Mahmoud A. Ghandour

Assiut University
Faculty of Science
Chemistry Department

Date: June, 2019
Time: 3 hours

Final Examination In Selected Topics in Organic Chemistry (414 C)

Answer the following THREE sections: (50 Marks)

Section (A): Polymer Chemistry (17 Marks)

1- Briefly explain *three* only of the following: (9 Marks)

a) Tacticity in vinyl polymers
b) Anionic ε-caprolactam polymerization
c) Structural characteristics of polymers
d) Vulcanization of rubber

2- Answer *two* only of the following questions: (8 Marks)

a) Discuss the classification of polymers according to their structures?
b) Outline the polymerization process of styrene using Zeigler-Natta catalyst?
c) Propose a mechanism for the Chain-Growth polymerization of styrene using benzoyl peroxide as the initiator?

Section (B) (17 Marks)

Answer the following questions

1- **Match the type of bond with the role below: (4 Marks)**

Bond type	Role
(a) Phosphodiester	1- Joins complementary nucleotides in two strands.
(b) *N*-glycosidic	2- Joins adjacent nucleotides in one strand.
(c) Phosphate ester	3- Links base to pentose in nucleotide.
(d) Hydrogen	4- Difference between a nucleoside and a nucleotide

2- **Write on the following terms: (8 Marks)**

a- RNA and its types.
b- The genetic code.
c- The reverse transcriptase.
d- The types of mutation.

3- **Draw the structures of the following species: (5 Marks)**

(a) Dideoxyinosine.
(b) Deoxyadenosine 5'-monophosphate.
(c) Cytidine 5'-monophosphate.
(d) Deoxyguanosine.
(e) Azidothymine.

باقى الأسئلة فى الصفحة التالية

Section (C) (16 Marks)

1. Give a short note about caffeine and its mechanism in human body? **(3 Marks)**

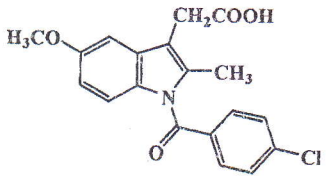
2. **Draw the structure for the following compounds**: **(3 Marks)**

   (a) Acetyl salicylic acid. (b) 1,3,7-Trimethylxanthine.

   (c) Clotrimazole.

3. Give three natural sources for the caffeine. **(2 Marks)**

4. **Write the chemical name of the following drugs**: **(8 Marks)**



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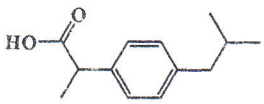

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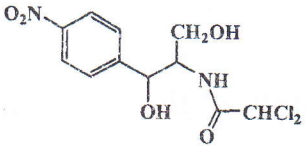

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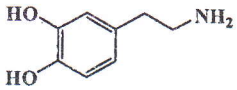

D

Assiut University
Faculty of Science
Chemistry Department

June 2019
Time: 2 hours
(50 Marks)

Second Semester Examination for Biological Students
Subject: Analytical Chemistry (C- 460)

Answer the following questions: ..... (50 Marks)

Q_1) Answer Only Two from the following: (12.5 Marks)

a) Write on the following:
i. Acid –Base indicators. *ii.* Electrochemical cell.

b) If you are provided with 0.1M NH_4OH (100 ml) and titrated with 0.1M HCl. Drive the pH value ($k_b = 1.35x10^{-5}$)
i. at the beginning of the titration, *ii.* after the addition of 50 ml HCl
iii. at the end point and mention the indicator used and why.

c) Give the reason for:
i. Mohr method is applicable in neutral solution.
ii, Supporting electrolyte is used in the polarographic analysis.

Q_2) Answer Only Two from of the following: (12.5 Marks)

a) Complete:
i. The indicators used in the titration of strong acid and strong base are ---------, while the indicator -------- is used in the titration of weak base with strong acid and ---------- is used in the titration of weak acid with strong base.
ii. The equation which gives the relation between ($E_{1/2}$) and diffusion current i_d is --------.
iii. The indicator in Mohr is ----, while in Volhard method the indicators are --------- and in Fajan method the indicators are ----------.

b) Write on the following:
i. Buffer solutions. *ii.* Factors affecting in half wave potential $E_{1/2}$.

c) Calculate the equivalent weight for:
i. **KMnO4** in acidic and basic medium. *ii.* **$K_2Cr_2O_7$** *iii.* **H_3PO_4**
(K=39, Mn = 55 , O = 16, Cr = 52, P = 31, H = 1)

Q_3) Answer Only Two from the following: (12.5 Marks)

a) Define Ilkovic equation and then calculate the diffusion current id for the reduction of $5x10^{-4}$ M Zn^{2+} which has diffusion coefficient D= 0.7210^{-5} cm^{-2} sec., m = 15mg/ sec. and t = 4sec/drop.

b) Drive the pH for the titration of 100ml (1N) CH_3COOH using (1N) NaOH. Calculate pH
i. before the titration, *ii.* after the addition of 50 ml NaOH
iii. after the addition of 110 ml NaOH. ($k_a = 1.86x10^{-5}$)

c) Write on the following:
i. Determinaion the equivalent point in potentiometric titration and its advantage.
ii. The advantages of dropping mercury electrode.

Q_4) Answer Only Two from the following: (12.5 Marks)

a) Write on the following:
i. Standard hydrogen electrode. *ii.* Limitation of volumetric precipitation titrations.

b) Show how you can use polarographic technique in quantitative analysis

c) Define the following:
i. Molar conductivity, equivalent conductivity and cepcific conductivity.
ii. Nernst equation.

----------Good Luck----------

Examiner: *Prof. Dr. Azza M.M.Ali*

Assiut University Faculty of Science Chemistry Department	Second Semester Final Examination Instrumental Analysis (C-445) Credit Hours System	June 2019 Time: 2 hour

Section (A) (25 Marks)

Answer Only Seven From the Following Questions:

Q.1. The drug flutamide (FLU) gives an adsorptive striping voltammetric peak at a carbon-paste electrode. A 50.0 mL sample containing FLU yielded a peak height of 0.37 μA. When 2.0 mL of 3.0 μM FLU was spiked to the sample, the peak increased to 0.80 μA. Find the concentration of FLU in the sample.

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Q.2. Compare between polarizable and non-polarizable electrodes

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Q.3. Write on Ilkovic equation.

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Q.4. Mark (√) for the correct statement and (X) for the wrong statement

a) Due to Hg is oxidized; it restricts the use of electrode as anode [ ]

b) Current is sampled twice in normal pulse polarography [ ]

c) In anodic stripping methods, the WE behaves as a cathode during the deposition step [ ]

d) Nitrogen can be removed by passing an inert gas (O_2) through the analyte solution for several minutes [ ]

e) Diffusion is the movement of ions from region of higher concentration to region of lower concentration [ ]

f) Normal pulse is about 5-10 times more sensitive than differential pulse polarography [ ]

Q.5. Write on the principle of electrochemical biosensor (Give an example).

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Q.6. Write on advantages to measuring the difference current in square wave voltammetry

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Q.7. Discuss the role of auxiliary electrode: (with drawing)

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Q.8. The oxidation of dopamine (DA) is a $2e^-$ process. A cyclic voltammetric anodic peak current (I_p) of 2.2 μA is observed for 0.4 mM solution of DA in acetate buffer at glassy carbon electrode of 2.6 mm^2 with a scan rate (v) of 25 mV/s. What will I_p be for v =100 mV/s and 1.2 mM DA?

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Q.9. Write on limitations of Dropping Mercury Electrode

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Section (B) (25 Marks)

Answer Only Five From the Following Questions:

Q.1: Show differences between absorption spectroscopy and emission spectroscopy and explain the mathematical relationship between the intensity of fluorescence and the absorbance of an analyte solution.

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Q.2: Molecules in the excited can lose energy via both radiation and radiation-less processes. Discuss this statement showing all processes by which the molecules may relax to the ground state.

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Q.3: **Sketch the spectrophotometric titration curves for reactions between an analyte (A) and a titrant (T) to give a product (P) if a) both A & T absorb and b) both P and T absorb.**

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Q.4: **Discuss the mole-ratio method for determining the stoichiometry of a ligand-metal complex.**

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Q.5: Saito described a quantitative spectrophotometric procedure for iron based on a solid-phase extraction using bathophenanthroline in a poly(vinyl chloride) membrane. In the absence of Fe^{2+}, the membrane is colorless, but when immersed in a solution of Fe^{2+} and I^-, the membrane develops a red color as a result of the formation of a Fe^{2+}–bathophenanthroline complex. A calibration curve determined using a set of external standards with known molar concentrations of Fe^{2+} gave a standardization relationship of $A = 8.6 \times 10^3\ M^{-1}\ [Fe^{2+}]$. What is the concentration of iron in parts per million for a sample with a T of 10% (At. wt. Fe = 55.85)?

Q.6: EDTA forms colored complexes with a variety of metal ions that may serve as the basis for a quantitative spectrophotometric method of analysis. The molar absorptivities ($M^{-1}cm^{-1}$) of the EDTA complexes of Cu^{2+} and Co^{2+} at two wavelengths are given in the following table:

Metal	$\varepsilon_{462.9}$	$\varepsilon_{732.0}$
Co^{2+}	15.8	2.11
Cu^{2+}	2.32	95.2

Using this information, determine the concentrations of Cu^{2+} and Co^{2+} in mM in a solution that has an absorbance of 0.453 at the wavelength of 732.0 nm and 0.107 at the wavelength of 462.9 nm. The pathlength, b, is 2.00 cm.

Good Luck

Examiners: Dr. Hossieny Ibrahim & Dr. Ahmed Bayoumi