Mansoura University
Faculty of Science
Chemistry Department
Code: Chem. 242
Full Mark : 80 Mark

كلية العلوم
جامعة المنصورة

Second level
Program : Chemistry
Date : January 2012
Time Allowed : 2 Hours

Answer All Questions

Section A : Phase Rule (40 Marks)

First Question : (20 Mark)

[A] Define : (4 Mark)

(1) Component. (2) Alloy. (3) Transition temperature.

[B] Explain in detail the meaning of : (7 Mark)

(1) Efflorescence and deliquescence . (2) Conditions for intermetallic compound formation.

[C] Sketch the phase diagram of Peritectic system of solid solution. Label phases in each area. Explain, in detail, what happen on cooling liquids with different compositions of A and B.In each case mention phases, number of components and degrees of freedom. **(9 Mark)**

Second Question : (20 Mark)

[A] Define : (6 Mark)

(1)Polymorphism. (2) Degrees of freedom. (3) Phase reaction, (4) Peritectic reaction.

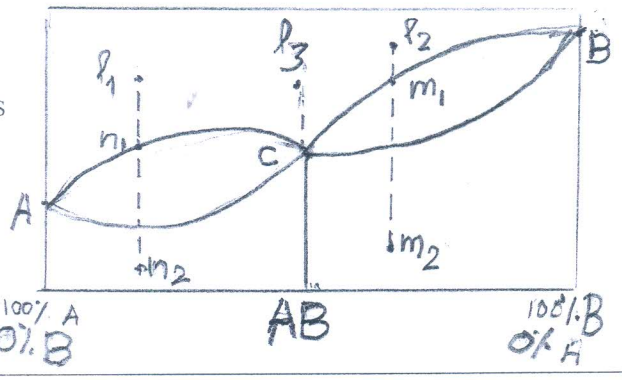
[B] Explain in detail the meaning of : (9 Mark)

(1) Homogeneous and heterogeneous system. (2) Primary and secondary solid solution.

(3) Properties and Conditions of forming solid solution.

[C] You are provided by the following phase diagram:

(a) Name the phase diagram system and label phases in each area. (b) Explain changes for a liquid of composition l_1 when cooled successively to n_1, n_2 liquid l_2 when cooled down to m_1, m_2. liquid l_3 down to c. In each case mention number of phases and degrees of freedom. **(5 Mark)**



Section B : Kinetic Theory of Gases (40 Marks)

[1] Prove that : (10 Mark)

(a) Van der Waal's equation has a critical volume. (b) Compressibility factor at the critical point= 3/8

[2] Compare between each two of the following using equations only : (24 Marks)

a. Law of corresponding state and van der Waal's equation.
b. Probability of finding an atom according to Boltzmann and Maxwell- Boltzmann distribution.
c. The kinetic energy of 32 g of O_2 and that of 4 g of H_2 at 25° C (R= 8.314 J mol^{-1} K^{-1}).
d. Collision frequency (Z) and mean free path (λ).

[3] Calculate the mean free path (λ) at 25° C and 1 atm for O_2 with a collision diameter of 3.5×10^{-10} m (R= 8.314 J mol^{-1} K^{-1} , $N_A = 6.02 \times 10^{23}$) . **(6 Marks)**

Good Luck

Mansoura University
Faculty of Science
Chemistry Department
Course: Physical Chemistry
Date : 24/12/ 2012

First term Examination
Chemical thermodynamic Chem 241
Second level
Full Mark : 60 Marks
Time Allowed : 2hours

١- هام أكتب الاجابة الصحيحة فى ورقة الاجابة ٢- وضح حل المسائل فى ورقة الاجابة ٣- الامتحان فى ثلاث ورقات

Answer the Following Questions:

I- A. Choose the response that best complete each statement: (1.5 marks for each one)

1. The word thermodynamics stems from two Greek words meaning
   a) conservation of heat b) interactions of heat
   c) study of heat d) movement of heat

2. Thermodynamics can be used to determine all of the following EXCEPT
   a) the direction in which a reaction is spontaneous. b) the extent to which a reaction occurs.
   c) the temperature at which a reaction is spontaneous. d) the rate of reaction.

3. Specific heat of a substance measures
   a) the amount of energy required to raise the temperature of a substance one degree
   b) the amount of time required to reach the boiling point
   c) total thermal energy in a substance
   d) the amount of energy required to raise the temperature of one gram of substance one degree

4. Consider the following reaction at constant pressure. Which response is true? $N_{2(g)} + O_{2(g)} \rightarrow 2NO_{(g)}$
   a) Work is done on the system as it occurs b) Work is done by the system as it occurs
   c) The amount of work depends on the pressure. d) No work is done as reaction occurs

5. When heat is added to a system, all of the following may happen EXCEPT
   a) increase in internal energy. b) decrease in the system's temperature.
   c) external work is done by the system. d) increase in the pressure in the system.

6. Which of the following statements is/are true concerning the first law of thermodynamics?
   a) The internal energy of the universe may increase, decrease, or stay the same for a given process, depending on the changes in enthalpy and entropy.
   b) Chemists often consider the universe to be made up of two things: the system and the surroundings
   c) If the energy of a system increases, then the energy of the surroundings must also increase to compensate.

7. Which of the following is **not** a correct description of enthalpy or change in enthalpy?
   a) Enthalpy is an indirect measure of the change in entropy of the surroundings.
   b) In an open system, $\Delta H = q$ so the change in enthalpy is a path function, not a state function.
   c) $\Delta H = q$ in a closed system d) In the absence of gas, $\Delta H \sim \Delta E$.

8. Ice kept in a well insulated thermo flask is an example of which system?
   a) Closed system b) Isolated systems c) Open system d) Non of these answers

9. In the formula $q = \Delta U + w$, work done by the system during expansion is (negative/positive), and heat (gained/lost) by the system is positive.
   a) negative, lost b) negative, gained c) positive, gained d) positive, lost

I-B. Answer the following questions

1.Derive the relationship: $\Delta G_{sys} = -T\,\Delta S_{univ}$ (3.5 marks)

2. Calculate ΔS when a diatomic ideal gas is compressed to one-third of its initial volume and simultaneously heated to three times its initial temperature. $C_v = (5/2)R$ (3 marks)

II- A. Choose the response that best complete each statement: (1.5 marks for each one)

1. An adiabatic expansion of a gas is one in which
   a) the pressure is kept constant
   b) the volume is kept constant
   c) it neither loses nor gains heat
   d) the temperature is kept constant

2. What is the name of a process in which pressure remains constant?
   a) adiabatic b) isochoric c) isobaric d) isothermal

3. In a cyclic process
   a) The total change in temperature of the system must be positive.
   b) The total change in internal energy of the system must be negative.
   c) The total change in internal energy of the system must be zero.

4. The primary function of any heat engine is to
   a) convert work into heat.
   b) creates energy.
   c) convert heat into work
   d) destroy energy and replace it with work

5. Ice melts at 50 °C, changing from ice (s) to water (l). Which of the following statements about the signs of the process are true?
   a) Work w is positive (but small).
   b) Heat q is positive.
   c) The change in entropy is positive.
   d) All of these answers

6. The efficiency of an engine can be defined as the
   a) total amount of work performed.
   b) ratio of work done to energy input.
   c) ratio of heat exhausted to heat intake.
   d) ratio of work done to energy exhausted.

7. A correct statement of the 2nd Law of Thermodynamics is:
   a) the random motion of gas molecules will be decreased if energy is added to a gas.
   b) heat will not flow spontaneously from a cold object to a hot object.
   c) no heat engine can have an efficiency greater than 30%.
   d) there is no process that can make heat flow from a cold object to a hot object.

8. The overall direction of change in the universe is toward
   a) a state of greater disorder.
   b) a state of increased mass in the universe.
   c) increased energy content of the universe.
   d) a state of increased organization.

9. All the following relationships are true except
   a) $\Delta H = \Delta H_{sys} + RT\ln K$ b) $\Delta G = \Delta H - T\Delta S$ c) $\Delta G = -RT\ln K$ d) $\Delta U = nRT\ln V_1/V_2$

II-B. Answer the following questions

1.When a perfect monatomic gas ($C_p = 5/2\ R$) is allowed to expand adiabatically from 25.0 L at one atm and 0 °C to a volume of 50.0 L . Calculate the final pressure and temperature. How much work is done? (3.5 marks)

2. Given that

$C(s) + O_2(g) \rightarrow CO_2(g)$ $\Delta G^\circ = -394.4$ kJ and

$CO(g) + O_2(g) \rightarrow CO_2(g)$ $\Delta G^\circ = -257.2$ kJ

calculate ΔG° for the following reaction. $C(s) + O_2(g) \rightarrow CO(g)$ (3 marks)

III- A. Choose the response that best complete each statement: (1.5 marks for each one)

1. A student determined the value of K_p for certain reaction at different temperatures. The value for ΔS° for the reaction can be determined from:
   a) the slope of the line resulting from a plot of ln K_p versus (1/T).
   b) the y-intercept of the line resulting from a plot of ln K_p versus T.
   c) the slope of the line resulting from a plot of K_p versus (1/T).
   d) the y-intercept of the line resulting from a plot of ln K_p versus (1/T).

2. The following reaction is endothermic: $3 O_2 (g) \rightarrow 2 O_3 (g)$
   a) spontaneous at all temperatures
   b) spontaneous at low temperatures
   c) non-spontaneous at all temperatures
   d) spontaneous at high temperatures

3. For the reversible reaction,
   $A_{(s)} + B_{(g)} = C_{(g)} + D_{(g)}$ $\Delta G^\circ = -350kJ$, which one of the following statements is true?
   a) The reaction is thermodynamically non-feasible.
   b) Equilibrium constant is greater than one.
   c) The reaction should be instantaneous.
   d) The entropy change is negative.

4. In view of the signs of $\Delta_r G^\circ$ for the following reactions
   $PbO_2 + Pb \rightarrow 2 PbO$, $\Delta_r G^\circ < 0$ and $SnO_2 + Sn \rightarrow 2 SnO$, $\Delta_r G^\circ > 0$,
   Which oxidation states are more characteristic for lead and tin?
   a) For lead +2, for tin +4
   b) For lead +4, for tin +2
   c) For lead +2, for tin +2
   d) For lead +4, for tin +4

5. The thermodynamically expression for change in entropy is given by
   a) q_{rev}/T b) q_{irrev}/T c) $w+q/T$ d) W_{irrev}/T

6. Which of the following substances is likely to have the highest standard entropy in the liquid state?
   a) CH_2Cl_2 b) C_5H_{12} c) CCl_4 d) CH_3OH

7. All of the following statements concerning entropy are true EXCEPT
   a) entropy is a state function.
   b) entropy is zero for elements under standard conditions.
   c) a positive change in entropy denotes a change toward greater disorder.
   d) entropy values are greater than or equal to zero.

8. The free energy of mixing of two immiscible liquids is :
   a) positive b) negative c) zero d) cannot tell

9. If, for an ideal heat engine, Q_H , Q_C, and W are, respectively, the heat absorbed, the heat rejected, and the work done per cycle, which of these is true?
   a) Q_H cannot be more than Q_C.
   b) Q_H cannot be more than W.
   c) W cannot be more than Q_C.
   d) Q_C cannot be more than Q_H.

III-B. Answer the following questions

1. The value of ΔH_{vap} for NH_3 is 32.4 J/mol K and the vapor pressure of NH_3 at 25°C is 10.3 atm. What is the normal boiling point of NH_3? (3 marks)

2. Starting from the definition of Gibbs free energy, derive the fundamental equation for the Gibbs free energy namely: $dG = Vdp - SdT$. (3.5 marks)

Examiner Prof. Dr. Awad I. Ahmed

Mansoura University Faculty of Science Physics Department		**First Term Exam, 2013** **Second level** Date: **30-12-2012** Time allowed : **2 hours** Full Mark: **80 Mark**
Subject: **Physics**		Course: **Physical Optics 221 ف**

Answer the Following Questions

[1] a- Give a model to discuss Fraunhofer diffraction pattern when using a rectangular slit. Derive an expression for the intensity distribution of the observed diffraction pattern. **[18 Marks]**

b- When a thin sheet of transparent material of thickness 6.3×10^{-4} cm is introduced in the path of one of the interfering beams, the central fringe shifts to a position occupied by sixth bright fringe. If $\lambda = 5460\ A^{o}$, find the refractive index of the thin sheet. **[9 Marks]**

[2] a-Derive an expression for the intensity distribution in a Fabry-Perot system of interference fringes in transmission when the two coated plate are of same transmission coefficient T and reflectivity R. **[18 Marks]**

b-In a Jamin's refractometer, two evacuated tubes each of length 25 cm are placed in the two beams. A gas is slowly admitted and 125 fringes cross the centre of the field of view. Calculate the refractive index of the gas. ($\lambda = 5460\ A^{o}$). **[8 Marks]**

[3] a- If you have tourmaline crystal and unpolarized monochromatic light source. Construct an experiment to produce a beam of plane polarized light. **[10 Marks]**

b- Give the arrangement of Young's experiment to produce interference fringes. Derive expression for the conditions of the bright and dark fringes. Descrip these fringes. **[17 Marks]**

Good Luck

Examiners: Prof. Dr. Taha Sakkar, Prof. Dr. Eman Seisa , Prof. Dr. Mohamed Kabeel

المستوى الثانى - كيمياء - للفصل الصيفى ٢٠١٢

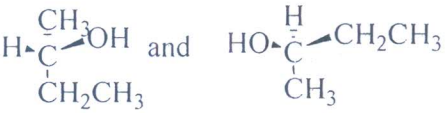
Mansoura University, Faculty of science, Chemistry Department		Final Examination in Physical organic Chemistry 232 Second level (Chemistry Students)
2 / 1/ 2013		Time Allowed: 2 hrs
ANSWERTHE FOLLOWING QUESTIONS		Full Mark : 80 Marks

1-**(30 Marks)**

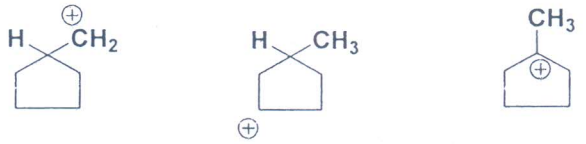
i- Consider the following pairs are enantiomers or two molecules of the same compound.

a) 

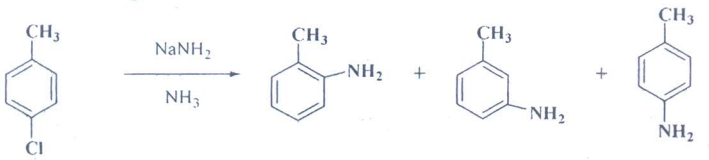
b) 

c) 

ii- Rank the following carbocation in order of their stability



iii- When *p*- chlorotoluene is treated with sodium amide in liquid ammonia, gave isomers toluidine in molar ratio



A) (1:1:1)

B) (0:1:1)

C) (0:2:1)

2--**(25 Marks)**

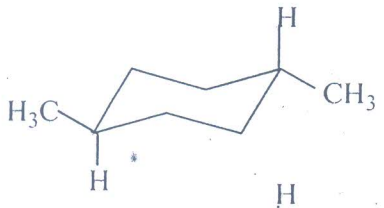
i- Suppose one could hydrolyze pure cis crotylchloride by SN^1 &SN^2 mechanism. Would you expect the product in each case to be cis isomer, the trans isomer or a mixyure/ Explain.

ii- Which is the lowest energy conformation of trans-1,4-dimethylcyclohexane?

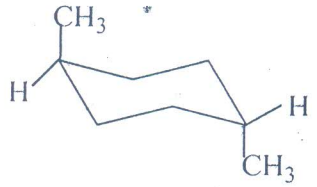
P.T.O

سؤ فضلك اقلب الصفحة

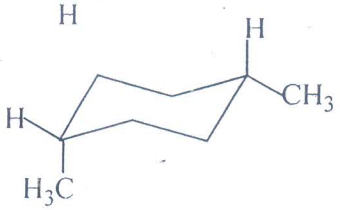
a-



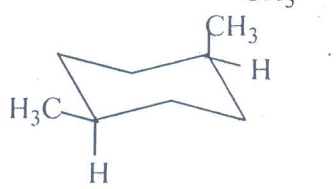
b-



c-

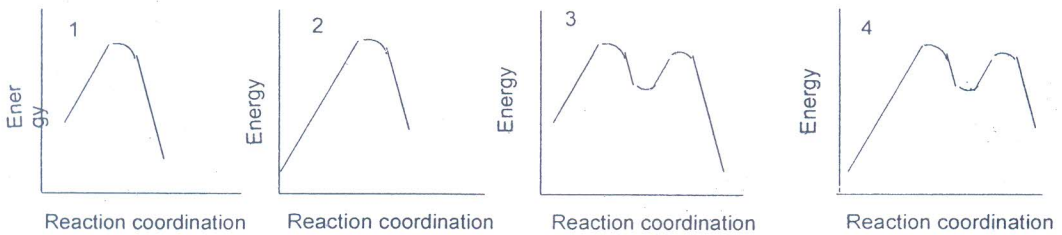


d-



e- More than one of the above

iii- Which of the following energy diagrams best represents the course of the reaction of *t*-butyl bromide with OH^- ?



A) 1
B) 2
C) 4
D) 3

3-(25 Marks)

-i- A- Write the Fischer projection formulae of product of (+) 2-Bromoctane with NaOH

B-Do you expect the product is optically active?

C- What is absolute configuration and sign of the product

D- What about the 2-Octanol formed by hydrolysis of racemic –2-Bromoctane.

ii- Draw Newman projection of all possible conformation of:
1, 2 dibromoethane? Determine the most stable conformation? Sketch its potential diagram?

GOOD LUCK

Prof.Dr. Wafaa S. Hamama

Mansoura University
Faculty of Science
Department of Chemistry

Date 09.01.2013
Time: Two Hours
Full Mark (60)

Exam. of Course 231(Principles of Organic Chemistry)
For 2nd Level (Chemistry and Chemistry/Biochemistry Students)

ANSWER THE FOLLOWING QUESTIONS

1- A The Friedel-Crafts alkylation of benzene with butyl chloride gives two products (major and minor). Explain with mechanism. [10 Marks].

B- Carbocation rearrangements can occur upon the addition of H_2SO_4/H_2O to 3,3-dimethyl-1-butene to give 2,3-dimethyl-2-butanol as a major product. Explain with mechanism [10 Marks] .

2- A) Predict the major organic product or products of each of the following reactions. [10 Marks]

i-

$$CH_3C{\equiv}CH \xrightarrow[HgSO_4]{H_2SO_4,\ H_2O}$$

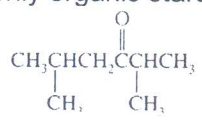
ii-

$$CH_3C{\equiv}CCH_3 \xrightarrow[\text{Lindlar's catalyst}]{H_2}$$

B) Based on the terms of radical substitution reactions, explain with mechanism the formation of cyclohexyl chloride from cyclohexane and chlorine. [10 Marks]

3- A) -Alkenes can be converted to alkynes by bromination and two consecutive dehydrohalogenation reactions. Give mechanism with 1-butene**(10 Marks)**.

B) Synthesize the following compound using an alcohol of not more than 4 carbons as the only organic starting material [10 Marks].



A

Good Luck

Prof.Dr. Mohamed Abbas Metwally and Prof.Dr. Sayed El-Desoky

Mansoura University
Faculty of Science
Chemistry Department
Subject : Inorganic Chemistry
Course(s): Representative Elements
Code : Chem (221)

First term
Second Level (Chemistry) Students.
Date : 13 January, 2013
Time Allowed: 2 hours
Full Mark : 80 Marks

Answer The Following Questions

I. Give an explication of EIGHT ONLY of the following : **[32 Marks]**

1. A positive ion is smaller than the corresponding atom **whereas** a negative ion is bigger than the corresponding atom.
2. The increasing of reactivity of alkali metals, with increasing of the atomic number, is demonstrated by their reactions with water.
3. Magnesium (II) chloride is more heavily hydrated than barium (II) chloride .
4. Conductivity measurements of alkali metal ions give results in the order : ($Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$) in an aqueous solution .
5. Boron trifluoride (BF_3) is Lewis acid.
6. The hardness of diamond is due to its structure .
7. Carbon monoxide is a good reducing agent **and also**,is an important ligand . **Explain and support with an example** for each of both properties.
8. i) Univalent thallium ($_{81}Tl$) compounds are the most stable.
   ii) The nitrogen molecule (N_2) is generally unreactive.
9. **i)** White phosphorus should never be allowed to come into contact with body skin.
   ii) Photochromic eyeglasses have a small amount of added silver chloride.
10. **i)** Fluorine is the most reactive of all the elements . **Give four reasons .**
    ii) The concentrated (H_2SO_4) acid is strong dehydrating agent . **Give two examples .**

II. A) Write shortly on FOUR ONLY of the following, on the basis of the chemical reaction equations : **[20 Marks]**

1. Biological importance of carbon dioxide.
2. Isolation of the pure elemental **silicon** from **silica** (SiO_2)
3. Production of nitric acid (HNO_3) by **Ostwald** process.
4. Separation of aluminum metal from its **ore (bauxite) ; AlO(OH) .**
5. Photodissociation of nitrogen dioxide (NO_2) and ozone (O_3) levels in sunny days .

II. B) Complete the following chemical reaction equations: **[10 Marks]**

1. $Li_3N + D_2O \rightarrow$
2. $_7N^{14} + {}_0n^1 \rightarrow$
3. $Be_2C + H_2O \rightarrow$
4. $H_3BO_3 + H_2O \rightleftharpoons$
5. $Ca_3(PO_4)^2 + H_2O \rightarrow$

III.1) Give an account on ortho and para Hydrogen. **[4 Marks]**

2). Deseribe the structure and nature of bonding of Diborane (B_2H_6), **[4 Marks]**

3). An insulator like silicon can be converted to a semiconductor (n-type and /or p- type). Explain . **[6 Marks]**

4). Account for the high (1st IE's) for ($_{12}Mg$, $_{15}P$ and $_{18}Ar$) and the low (1st IE) for ($_{16}S$). **[4 Marks]**

..... Best Wishes .....

Dr. Doaa Abd-El-Latif & Prof. Dr.Tawfik Rakha

المستوى الثانى - كيمياء - للمواد الصلبة لـ ٤٣ ك

Mansoura University
Chem. 243
Faculty of Science
Final Exam

Chemistry Department
1st semester 2013
Full Mark: [80]
Time Allowed: 2 hrs

Answer the following questions:

1. There are three primary ways to describe the optical quality of a material. Explain and give examples. [8]

2(a) What are the properties of laser? Explain some of its applications. [5]

(b) Identify the charge carriers in metallic substances, semiconducting substances, and conductive liquids. [3]

(c) Which type of material is the best conductor of electricity and why? [4]

3. Complete the following table: [8]

	Sc	BCC	FCC
Volume of unit cell	a^3		
Lattice points per cell		2	
Coordination number			
Repeating layers	AAAA		
Occupied Space			
Sphere Radius		$a\sqrt{3}/4$	

4. Distinguish between diamagnetic, paramagnetic, ferromagnetic and anti-ferromagnetic materials. Give examples. [12]

5. Iron crystallizes in a body-centered cubic structure with the length of the unit cell "a" 286.1 pm at 25°C. What is the nearest distance between iron atoms? [10]

اقلب الصفحه من فضلك

6. Fluorite has an fcc structure with 4 CaF_2 groups in the unit cell. At 25°C the (111) reflection with x-rays of λ= 154.2 pm occurs at θ = 14.18°. Calculate the length of the unit cell "a" and the density of fluorite at 25°C.[10]

7. The band gap in pure germanium is 0.67 eV. The electron and hole mobilities are $u_\varepsilon = 0.38\ m^2\ V^{-1}\ s^{-1}$ and $u_h = 0.18\ m^2\ V^{-1}\ s^{-1}$. Calculate the conductivity of Ge at 400 K. [10]

8. Calculate the Fermi level ε_F for Na at 0 K from the free-electron- theory model. The density of Na at 0 K is about 10^3 kg m^{-3}. [10]

N.B. Atomic mass (g mol^{-1}) Ca=40 and F=9.5, $N_A = 6.02 \times 10^{23}\ mol^{-1}$, $h = 6.626 \times 10^{-34}$ Js, $C = 3 \times 10^8\ ms^{-1}$,

Good Luck *Prof. Shawky Hassan*

المستوى الثانى - فيزياء - فيزياء حيوية + فيزياء البيولوجى - معلمة فى الفيزياء الحيوية ص ١١

Mansoura University
Faculty of Science
Physics Department
Course code: Bio-Phys 211
Course title: General biophysics

First term 2012-2013
Date: 16-1-2013

2nd Level students
Biophysics-Physics-Microbiology-Chemistry-Biochemistry-Chemistry Botany - Chemistry Zoology and Environmental Science
Full Mark: 80
Allowed time: 2 hours

Answer all the following questions:

1- A- Write true (√) or False (χ) [each item = 1.5 Mark]

i. The frequency range detected by the human ear is between 20 Hz-20000 KHz.

ii. Hypermetropia caused by irregularity shaped cornea results in light focusing in front of retina.

iii. There are three types of color sensitive cones in retina.

iv. The human eye is organ design to receive visible light having wavelengths between 380 and 760 μm.

v. Ionizing radiations are known to cause DNA damage, cancer, mutation and birth defects.

vi. The electric potential of the heart can be measured by electro-encephalogram EEG.

vii. There are negative charges on the outside of the cell membrane of neurons than the inside produces a resting potential of -70 mV.

viii. The conduction speed of unmyleinated axons is given by $u = 1.8\sqrt{a}$ (m/sec) where a is the radius of axon (μm).

ix. The efferent neurons are those axons travel from sensing areas to the spinal cord .

x. The ear canal behaves like a pipe open from one end and the other end is closed by tympanic membrane.

B- Calculate the lowest frequency in which sound resonates in ear, knowing that the velocity of sound is C=350 m/sec and the ear canal length is L=2.5 cm (n=1 when $L=\lambda/4$). **[5 Marks]**

C- What is the total flow resistance of a two parallel arteries in a calf have radius 0.5 mm and length 100 mm? If the volume flow rate of blood through these arteries is 1.2×10^{-6} m^3/sec, what is the pressure drop across the arties knowing that $\eta_{blood}=3.5\times10^{-3}$ poise.

[5 Marks]

2- A- Complete the following sentences: (each item = 2 Mark)

- The P-Wave in ECG indicates .....(1).....of the right and left .....(2).....

الإمتحان مكتوب على وجهى الورقة

- The alpha waves of EEG have frequency range ……(3)……Hz in ……(4)……state.
- In ……(5)…….effect, electron is ejected from the atom and is accompanied by scattered …(6)…….

B- Find an expression given for the half life time and decay constant of a radionuclide?

[8 Marks]

C- If you have 1gm of ^{226}Ra that emits $3.7x10^{10}$ photon/sec. What is the decay constant and half life time knowing that Avogadro's number=$6.02x10^{23}$. **[5 Marks]**

3- A- Choose the correct answer : **[each item = 1 Mark]**

i. The retina of the eye contains two types of photoreceptors cones and …… (Spheres- triangles- rods-rectangles).

ii. The flow of ions causes an electric current in the ion chamber with intensity proportional to the ……of ions (volume- number-density –shape).

iii. The beta particles are a fast moving ……(protons-neutrons-electrons-photons).

iv. …… provide the eye's color sensitivity (Rods –Cones- Corneas –Irises).

v. The percent of hydrogen atoms in human body is (53%-63%-73%-83%).

vi. About …….. of cones are green sensitive. (23%-42%-52%-62%).

vii. 1 gray equal (1 rad- 10 rad-100 rad-1000 rad).

viii. 1 rem equal (0.1 Sv-0.01 Sv-0.001 Sv-0.0001 Sv).

B- Define the following: **[each item = 2 Marks]**

a. Depolarization
b. Graded potential
c. Radiation flux
d. Decibel
e. Magnetic resonance imaging

C- Calculate the capacitance per unit length and area of an unmyleinated axon, if the material in the axon membrane has dielectric constant K=7 and $\varepsilon_o=8.85x10^{-12}$ S/ohm-m and the radius a= $3.5x10^{-6}$ m and thickness of membrane is b=$5x10^{-9}$ m. **[7 Marks]**

D- If a person has an unaided near point of 0.5 m, what would the power of a lens make him able to see an object at 25 cm? **[5 Marks]**

Best wishes:

Examiners: Dr. H. Kamal Dr. N. Kenawi Dr. M. Mansour

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بسم الله الرحمن الرحيم

Mansoura University Faculty of Science Department of Chemistry January, 23, 2013	كلية العلوم جامعة المنصورة	Second Level, Chemistry and Biochemistry students Final exam 211Chem Fundamentals of Analytical Chemistry Time allowed: 2 hours

Answer the following questions:

1. *Define the following:* **(10 marks)**

a) Zimmermann Reinhard's reagent

b) Metallic indicators

c) Standard deviation

d) Buffer capacity

e) Precision and accuracy

f) Solubility product

g) Titration Error

h) Reducing agent

i) Absolute and effective stability constant for EDTA complexes

1.b) Calculate the actual potential (*E*) of 50ml o.1N Fe^{2+} solution on addition of the following amounts of 0.1N Ce^{4+} solution

a) 0ml b) 10ml c) 25ml d) 50ml e) 60ml

($E^{\circ}_{Fe3+/Fe2+}$ =0.77 V, $E^{\circ}_{Ce4+/Ce3+}$ =1.61 V) **(5marks)**

2.a) Give an account on the following: **(12marks)**

i) Types of titrations of EDTA
ii) Importance of using buffer solutions in complexometric titration
iii) Restrictions of usage of Mohr method
iv) Application of $KMnO_4$ for analysis of mixture of (Fe^{2+} +Fe^{3+})

2.b) The following set of chloride analysis were reported; 103, 106, 107, 114mg/l. Determine if any .a of these values could be excluded (tabulated value of Q is 0.829) **(3 marks)**

3.a) Calculate the pH of the following mixtures: **(9 marks)**

i) 50ml HCl 0.1N+30ml NH_4OH 0.1N +20ml H_2O

ii) 50ml HCl 0.1N+50ml NH_4OH 0.1N

iii) 50ml HCl 0.1N+60ml NH_4OH 0.1N (Kb_{NH4OH}= $1.8x10^{-5}$)

3.b) A sample of NaCl weights 0.5 gram. 50 mL of 0.21M $AgNO_3$ is added to precipitate AgCl . The excess silver nitrate is titrated with 0.28M potassium thiocyanate to give 25.5 mL at the end point. Find the percentage of NaCl in the sample. (Na=23, Cl= 35.5) **(6 marks)**

4.a) Find the confidence interval for the following titration volumes:

50.00, 51.00, 50.50, 49.80

(knowing that the standard deviation (s)= 0.02 and t=4.2 at 95% confidence) **(3 marks)**

4.b) Calculate the volume of concentrated HCl solution , *having density1.14g/ml and 36% w/w percentage concentration,* required to prepare 500.00mL of 0.20 N HCl solution. (H= 1.00, Cl=35.50.) **(3 marks)**

4.c) Calculate Ksp of Ag_2CrO_4 (M.wt.= 332) knowing that its solubility is 0.004g/100ml at 25°C. **(3 marks)**

4.d) 250ml aqueous solution containing 0.05mg of copper. Express the concentration of copper in ppm and ppb scale **(3 marks)**

4.e) Indicate 3 types of indicators used in oxidation reduction titrations **(3 marks)**

Best wishes

Prof. Dr Mohamed M. El-Defrawy **Prof. Dr. Magdi E. Khalifa**