Mansoura University Faculty of Science Chemistry Department Subject: Inorganic Chemistry Course(s): s-and-pBlock Elements		First Term Second Level (Biochemistry) Students . Date : 5 Jan. 2011 Time Allowed: Two hours Full Mark : 80 Marks

Answer the Following Questions

1. Give an explication of the following :   [30 Marks]

1. The increasing of reactivity of alkali metals, with increasing of the atomic number, is demonstrated by their reactions with water.

2. Magnesium (II) chloride is more heavily hydrated than barium(II) chloride.

3. Boron trifluoride (BF_3) is Lewis acid.

4. Photochromic eyeglasses have a small amount of added silver chloride.

5. The hardness of diamond is due to its structure.

6. i) Univalent thallium ($_{81}Tl$) compounds are the most stable.
   ii) Liquid hydrogen, is used as a fuel in large booster rockets.

7. i) White phosphorus should never be allowed to come into contact with body skin.
   ii) The nitrogen molecule (N_2) is generally unreactive.

8. The concentrated (H_2SO_4) acid is strong dehydrating agent. **Give two examples.**

9. Fluorine is the most reactive of all the elements. **Give Four reasons.**

10. The halogen molecules (X_2) are all colored.

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. Photodissociation of nitrogen dioxide (NO_2) and ozone (O_3) levels in sunny days.

4. Hydrogen peroxide (H_2O_2) can act as **either** an oxidizing agent **or** as a reducing agent.

5. Production of sulphuric acid (H_2SO_4) by contact process.

II. B.) Complete only Five of the following chemical reaction equations : [10 Marks]

1. B_2O_3 $+P_2O_5$ $\rightarrow$
2. CaC_2 $+ H_2O$ $\rightarrow$
3. Li_3N $+ D_2O$ $\rightarrow$
4. $Ca(H_2PO_4)_2$ $+ NaHCO_3$(at 300°C) $\rightarrow$
5. C_8H_{18} (gasoline) $+ O_2$ $\rightarrow$
6. $Ca_3(PO_4)_2$ $+ H_3PO_4$

III. 1. Describe the structure and nature of bonding of the following :   [20 Marks]

   a) Diborane (B_2H_6),   **b)** Trimethylamine ($CH_3)_3N$

2. An insulator like silicon can be converted to a semiconductor (n-type or p-type). **Explain**

3. Tabulate three oxy-phosphorus acids and give the chemical formula, structure, oxidation state of phosphorus atom and the reducing property of each acid.

Best Wishes   **Prof. Dr. Tawfik Rakha**

| Mansoura University, Faculty of science, Chemistry Department		Final Examination in Organic Chemistry 231 Second level (Chemistry Special & chemistry/Biochemistry Students
11/ 1/ 2011		Time Allowed: 2 hrs
ANSWER THREE QUESTIONS		Full Mark : 60 Marks (20 marks for each quastion)

1] Choose the right answer from the following answers :- (20 Marks)

i- Reaction of acetaldehyde with Grignard reagent gives

  a) Primary alcohol   b) secandary alcohol   c) No alcohol

ii- Reaction of phenyl hydrazine with carbonyl group gives

  a) phenyl hydrazone   b) phenyl oxime   c) phenyl semicarbazide

iii- Reaction of cyclohexanone with Zn / HCl gives

  a) cyclohexene   b) cyclohexane   c) methyl cyclopentane

iv- Reaction of 1-butanol with $KMnO_4$ gives

  a) butanaldehyde   b) butanone   c) isobutene

v- Reaction of $CH_3CH=CHCHO$ with $NaBH_4$ gives

  a) $CH_3CH_2CH_2CHO$ b) $CH_3CH=CHCH_2OH$ c) $CH_3CH_2CH_2CH_2OH$

2]a- Groups that release electrons activate the benzene ring and thus direct to ortho- and para-position. By equations explain that. (10 Marks)

b- Which of the following compounds is aromatic, antiaromatic, and nonaromatic? (10 Marks)
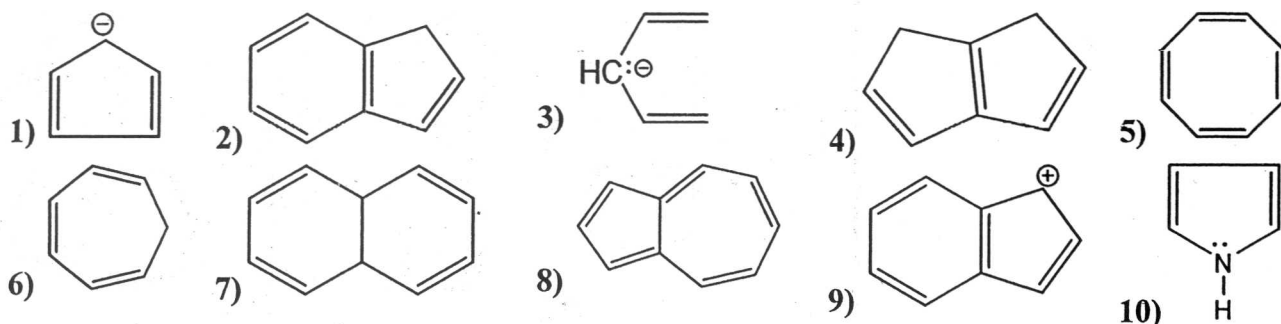
3]a- 3,3-dimethyl-1-butene undergoes addition reaction with HBr to give two different alkyl halides ; 3-bromo-2,2-dimethylbutane as minor product and 2-bromo-2,3-dimethylbutane as a major product. Explain with mechanism (10 Marks)

b- Effect of methanol/HA on 2,2-dimethyl oxirane via S_N^1 mechanism/explain.(5 Marks)

c- Alkyl halides synthesize from alcohols using HBr and PBr_3. Explain with mechanism ? (5 Marks)

4] a- Grignard reagent is a good versatile reagent for synthesis, show its reaction with. [two only, 10 Marks)

i- Acetaldehyde

ii- Ethyl acetate

iii- Acetonitrile

b- propose a synthesis of o-bromonitrobenzene as a sole product from benzene. Explain mechanism of nitration. (10 Marks)
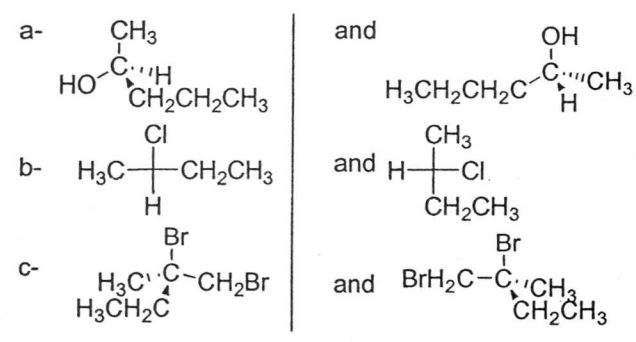
GOOD LUCK

Prof.Dr. Saad Elmorsy   Prof.Dr. Wafaa Hamama

Mansoura University, Faculty of science, Chemistry Department		Final Examination inPhysical organic Chemistry 232 Second level (Chemistry Students)
27/ 1/ 2011		Time Allowed: 2 hrs
ANSWERTHE FOLLOWING QUESTIONS		Full Mark : 80 Marks

1- a- Do the following structures represent identical molecules or a pair of enantiomers[R/S]? **(30 Marks)**

a-

$$HO-\overset{\overset{CH_3}{|}}{\underset{CH_2CH_2CH_3}{C}}{\cdots}H \quad \text{and} \quad H_3CH_2CH_2C-\overset{\overset{OH}{|}}{\underset{H}{C}}{\cdots}CH_3$$

b-

$$H_3C-\overset{\overset{Cl}{|}}{\underset{H}{|}}-CH_2CH_3 \quad \text{and} \quad H-\overset{\overset{CH_3}{|}}{\underset{CH_2CH_3}{|}}-Cl$$

c-

$$\underset{H_3CH_2C}{\overset{H_3C}{\diagdown}}\overset{\overset{Br}{|}}{C}-CH_2Br \quad \text{and} \quad BrH_2C-\overset{\overset{Br}{|}}{\underset{CH_2CH_3}{C}}{\cdots}CH_3$$

b- Using Newman projection, draw the most stable conformer for the following:
3-methylpentane, considering rotation about theC-2- C-3 bond

**c-** Which of the following is the strongest nucleophile

i- $CH_3COO^{\ominus}$ ii-- $CH_3\overset{..}{\overset{..}{O}}^{\ominus}$ iii- $RS^{\ominus}$ iv- NH_3

2-a- Consider the reaction of I^- with CH_3CH_2Cl. The **rate constant** [from kinetic study] for the reaction at 60°C = 5 x 10^{-5} L mol^{-1}s^{-1}. **(25Marks)**

i] Would you expect the reaction to be S_N1 or S_N2 ?
ii] what is the reaction rate

Experimental Number	CH_3CH_2Cl.	I^-	Reaction rate
1	0.1 mol L^{-1}	0.1 mol L^{-1}	
2	0.1 mol L^{-1}	0.2 mol L^{-1}	
3	0.2 mol L^{-1}	0.1 mol L^{-1}	
4	0.2 mol L^{-1}	0.2 mol L^{-1}	

b- Which set of conditions would you use to obtain the best yield in the reaction shown?
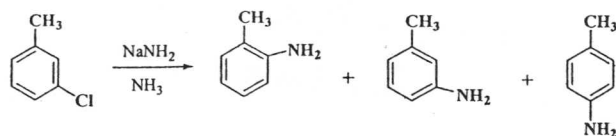
$$H_3C-\overset{\overset{CH_3}{|}}{\underset{CH_3}{C}}-Br \quad \xrightarrow{\text{?}} \quad H_2C=C\overset{CH_3}{\underset{CH_3}{\diagdown}}$$
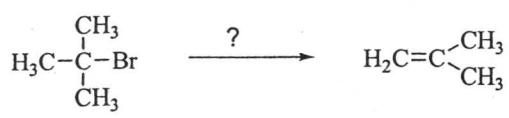
i- H_2O,heat   **ii-** CH_3CH_2ONa/CH_3CH_2OH,heat   **iii-** Heat alone

iv- H_2SO_4 **v-** None of the above

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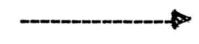
c- When *m-* chlorotoluene is treated with sodium amide in liquid ammonia, gave three isomers of toludine in molar ratio(1:1:1) (1:2:1) , (2:1:1), (1:1:2) or (2:1:2).Propose plausible mechanisms that account for the formation of each product

3- a- One of the following methods give a much better yield of the ether by a Williamson synthesis than the other. Explain which is the better method and why pointing tocompetition between substitution and elimination reaction. **(25 Marks)**
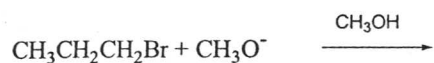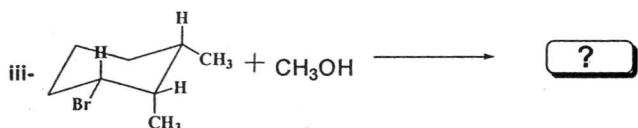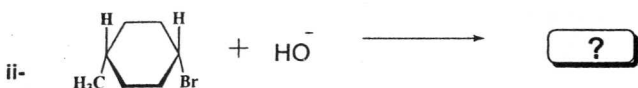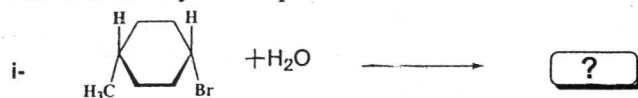
$$CH_3CH_2CH_2Br + CH_3O^- \xrightarrow{\ \ CH_3OH\ \ }$$

$$CH_3\underset{\underset{CH_3}{|}}{CH}CH_2Br + CH_3O^- \xrightarrow{\ \ CH_3OH\ \ }$$

$$CH_3CH_2CH_2Br + CH_3\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}O^- \xrightarrow{\ \ (CH_3)_3OH\ \ }$$
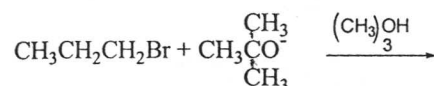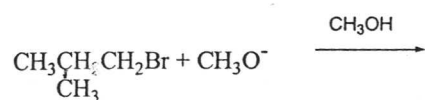
b- Complete and write the mechanism of the following reactions. Discuss the region -& stereochemistry of the product

i-

$+H_2O$ ⟶ ?

ii-

$+$ HO^- ⟶ ?

iii-

$+ CH_3OH$ ⟶ ?

c- Which of the following carbocations would you expect to rearrange?

i⁻   ii⁻   iii⁻   iv⁻ $CH_3CH_2\overset{\oplus}{C}HCH_3$ v⁻ $CH_3\overset{\underset{|}{CH_3}}{CH}\underset{\oplus}{C}HCH_3$
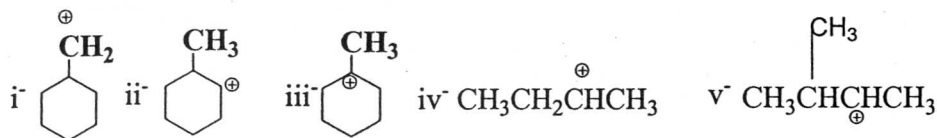
GOOD LUCK   **Prof.Dr. Wafaa Hamama**

Mansoura University Faculty of Science Chemistry Department Code: Chem.242 Subject : Kinetic Theory of Gases- Phase Rule		First Term Second Level Program : Chemistry Date : Jan 2011 Time Allowed : 2 hours Full Mark : 80 Marks

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Answer All Questions

First Question :

[A] Write on :
   (i) Number of components C.   (ii) Primary and secondary solid solution .
   (iii) Intermetallic compounds.   (10 marks)

[B] Sketch the phase diagram of :
   (i) The sulphur system.   (ii) Two component simple eutectic system characterized by formation of a compound with incongruent melting point.
   In each case label areas, lines and points of intersection denoting in each case the number of phases and degree of freedom.   (10 marks)

Second Question :

[A] Write on :
   (i) Polymorphism. (ii) Efflorescence and deliquescence.
   (iii) Properties and Conditions of forming solid solution.   (10 marks)

[B] Sketch the phase diagram of :
   (i) Two component forming monotectic system.
   (ii) Peritectic system of two solid solution.
   In each case label areas, lines and points of intersection denoting in each case the number of phases and degree of freedom.   (10 marks)

Third Question :

[A] What are the assumptions of molecular kinetic theory of gases, derive the general kinetic gas theory equation.   (10 marks)

[B] Calculate the molar volume of CO gas at 350 K and 300 bar according to:
   (i) The ideal gas equation.
   (ii) The Virial equation. B_v of CO is – 25.2 cm mole at this temperature.   (10 marks)

Fourth Question :

[A] Explain the following :
   Excluded volume – Collision frequency – Mean free path – Viscosity and conductivity of real gases
                (10 marks)

[B] Calculate the most probable mean and root mean square speeds for hydrogen (H_2) molecules at 42° C.   (10 marks)

(R=8.314 J mol^{-1}, k=1.38x10^{-23}JK^{-1}, N$_A$=6.022x10^{-23}, atomic weight; C=12 ,O =16, **H = 1**)

GOOD LUCK   Prof. Dr. M.A.Morsi , Prof. Dr. E. Arafa

Exam subject: Physical Chemistry	Mansoura University
Course (code): Solid State and Materials	Faculty of Science
Chemistry (Chem 243)	Chemistry Department
Year: Second Level/ Semester 1	20, Jan. 2011
Time allowed: 2 hours (80 Marks)	

I. Answer the following questions: (30 Marks)

1. What are the advantages of solid state batteries over normal batteries?

2. Indicate three main differences between X-ray diffraction and neutron diffraction.

3. Describe graphically (with equations) the relationship between magnetic susceptibility and temperature in paramagnetic, ferromagnetic and antiferromagnetic materials.

4. Describe how MX_6 octahedra link in sodium chloride, rutile and perovskite structures. (Hint: link by face, corner, etc.)

5. Which of the following Bragg reflections would appear in the diffraction pattern of a body-centred cubic lattice: 010, 111, 011, 222, 210, 220
   In what sequence they would appear in the diffraction pattern?

6. What are the advantages of fuel cells as a new source of energy?

7. Write down the anode and cathode reactions for a solid oxide fuel cell.

8. What are the unique properties of superconductors?

9. Mention three possible uses of X-ray powder diffraction.

10. Write down the electrode reactions for Sony rechargeable lithium-ion battery.

II. Indicate why? (30 Marks)

1. $La_{1-x}Ca_xMnO_3$ is ferromagnetic.
2. Defects occur in all solids even at low temperatures.
3. There is no electric equivalent of the permanent magnet.
4. α-quartz is widely used in quartz watches.
5. Intensities of diffraction peaks (I_{hkl}) are important in solving crystal structure.
6. Transmission electron microscopy is used to study the bulk of a solid material.
7. $BaTiO_3$ is ferroelectric.
8. A material with an ideal NaCl structure can not be pyroelectric.
9. $CaFe_2O_4$ inverse-spinel exhibits antiferromagnetism.
10. Bragg model of X-ray diffraction does not distinguish between a second order reflection from 010 planes and a first order reflection from 020 planes.

Please turn over for next page

III. Answer the following questions: (20 Marks)

(Unit cells of CsCl and CaF₂ are shown below)

1. How many formula units in the CsCl unit cell?
2. Is the lattice in CsCl body-centred? Why?
3. Mention two ways to describe the fluorite (CaF_2) structure.
4. Providing that the unit cell of CaF_2 is cubic (a = 5.5 Å), what is the density (in g/cm^3) of CaF_2? (At. wt. Ca = 40, F = 19; $N_A = 6.022 \times 10^{23}$ mol^{-1})
5. Does the 002 plane in the given fluorite unit cell represent a mirror plane? How many oxygen atoms in this plane?
6. What is the rotation (or inverse rotation) symmetry associated with the central *c*-axis in the given fluorite unit cell?
7. How many Ca^{2+} and F^- ions (separately) in 011 plane in the given fluorite unit cell?
8. If Ca^{2+} occupies all the cubic holes in the oxygen lattice of CaF_2, the stoichiometry would be ....and the structure will be similar to that of .... (Complete).
9. Anion Frenkel defects are common in fluorite-type materials. Why?
10. How to stabilize the cubic fluorite structure in ZrO_2? How to achieve maximum ionic conductivity of stabilized zirconia?
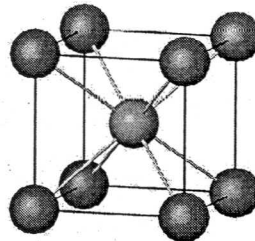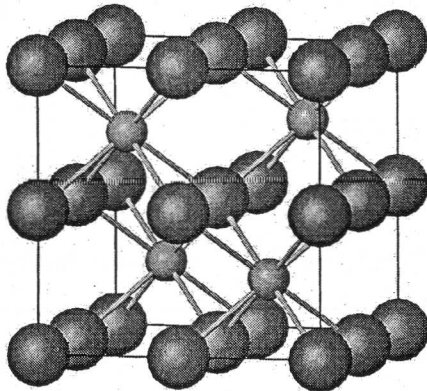
Best Wishes..   Examiner: Dr. Hany El Shinawi

University of Mansoura		First Term
Faculty of Science		Sophomore Students
		Date: January 2011
Physics Department		Allowed time: 2 hours
		المنصورة- مصر
Exam: Introduction to Biophysics	Code: 211 ف ح	Full Mark: 80 Mark

Answer all the following question:

[1] a- Discuss the electrical properties of a neuron? [10 Marks]

b- Calculate the pressure variation corresponding to a sound intensity of 10^{-16} W/cm². The density of air at 0°C and 1 atm pressure is 1.29×10^{-3} g/cm³. The speed of sound is 3.3×10^4 cm/sec ($I = 10^{-16}$ W/cm² $= 10^{-9}$ erg/s.cm²)? [5 Marks]

C- Discuss in detail different radiation biological effects on mammalians? [10 Marks]

[2] a- Estimate numerically the speed of propagation of nerve impulse propagation across an myelinated and unmyelinated axon? [7 Marks]

b- Calculate the photon flux at 1 m and 2 m from a ^{60}Co gamma source of activity 800 MBq? [8 Marks]

c- Define the followings: **(Answer five items only)** [10 Marks]
i) Friction force   ii) Sivert   iii) Ionization chamber   iv) Intensity of sound wave

iiv) Decibl   v) Non-stochastic Effect

[3] a- What is the total flow resistance of a three parallel arteries in the calf which have radius 1 mm and length 200 mm? b) If the volume flow velocity of blood though these arteries is 1.7×10^{-6} m³/S. What is the pressure drop across the arteries?
(Consider the viscosity of blood $= 3.5 \times 10^{-3}$ N.S/m²) [10 Marks]

b- Compare between each two items of the followings: **(Answer four items only)**

[20 Mark]

(i) Resonance in basilar fiber for high frequency and low frequency.

(ii) Compton effect and photoelectric effect.

(iii) Resting membrane potential and action membrane potential.

(iv) Blood pressure in systematic and pulmonary systems.

(iiv) α-particles and β -particles properties.

Best Wishes

Examiners: Dr. Hosam Salah-Eldin   Dr. Mohamed Saad-Eldin

   Prof. Dr. Maher El-Tonsi   Prof.Dr. Alaa Eldin El-koudry

المستوى الثاني - مادة ضوء فنزياى (فصل)
لبرامج (كيمياء - كيمياء حيوية - ميكروبيولوجى - كيمياء جيولوجى - ميكروبيولوجى - علوم البيئة)

Answer the following questions:

1-a) Discuss Fraunhofer diffraction using a rectangular slit. Drive an expression for the intensity distribution of the observed diffraction pattern.   (15 Marks)

   b) A grating with 8000 rulings/inch is illuminated with white light at normal incidence. Describe the diffraction pattern at the center and the first order assuming that the wavelength of the light extends from 4000A° to 7000A°.   (12 Marks)
....

2-a) Give a brief account with an explanatory of the optical arrangement of Newton s rings interferometer. Derive the necessary formula of these rings. Discuss that the forming of dark spot in the center of the rings at reflection confirm the principal of change of phase at reflection.   (15Marks)

   b) A thin sheet of transparent material have refractive index ($\mu = 1.6$) is placed in the path of one of the interfering beams in a biprism experiment using sodium light of wavelength ($\lambda = 5890$ A°). The central fringe shifts to a position normally occupied by the 12$^{\underline{th}}$ bright fringe. Calculate the thickness of the sheet.   (12Marks)
....

3-a) Give account with an explanatory diagram of the optical arrangement of the polarimeter. Explain the method of measuring the strength of a solution have optical activity with that polarimeter.   (15Marks)

   b) In a Mach – Zehnder, when one of the beams passes through a wide tunnel of length 10 meters, 120 fringes cross the center of the field of view. Calculate the change in refractive index if the wavelength of the light used is equal 5890 A°.
                (11Marks)

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Good Luck   Prof. Dr. Taha Sokkar, Dr. Mohamed Kabeel & Dr. Eman Sesa

Mansoura university
Faculty of science
Chemistry Department
Subject: principles of
analytical chemistry
Course code:Chem.211

2nd level Chemistry Students.
Date: Jan. 2011
Time allowed: 2 hours
Full mark: 60 mark

Answer the following questions

1- Chose the correct answer : **(10 marks)**

i- 36.5%(w/w) hydrochloric acid ,its density is 1.8 g / ml ,the normality of this solution is
    a- 18 N   b-1.8 N   c-0.18 N   d-0,9 N

ii- 3 gm CH_3COONa(FW=82) is dissolved in 50 ml water .the molarity of this solution is
    a- 0.73 M   b- 7.3×10^{-4} M   c- 1.7 M   d- 3.4 M

iii-solid NH_4Cl is dissolved in water , pH of this solution is
    a- pH > 7   b- pH < 7   c- pH = 7

iv- solution of 2.000 N ,if the equivalent weight is 10.0 g. eq./ l the strength of this solution is
    a- 20.000 g/l   b- 20.0 g/l   c – 20.00 g/l   d- 20 g/l

v- Which of these solutions is buffer solution .
    a- acetic acid + sodium acetate   b- sodium acetate + NH_4Cl c- NH_4Cl +oxalic acid

2- a- Find the confidence interval for the following experimental results : **(6marks)**
    50.0 , 5 1. 0, 5 0. 05,   49.80
    (knowing that standard deviation (s) = 0.02, and student t-test = 4.2 at 95%)

b- 250 ml aqueous solution containing 45.1 μ g of copper . Express concentration of
copper in part per million and part per billion units.

3- Calculate K sp for Ag_2CrO_4 if the solubility of Ag_2CrO_4 = 2.5×10^{-2} g/l
(F w = 322 g/mole) **(6 marks)**

4- 2 dm^3 of concentrated H C l (10M) was spilt into laboratory floor .it can be neutralized
With limestone powder ($CaCO_3$). **(6 marks)**

a- Give the equation for the reaction between limestone and HC l.
b- How many moles of HC l was spilt .
c- How many moles of $CaCO_3$ will neutralize the acid .
d- What is the mass of limestone powder is needed to neutralize the acid .

5- 750 mg sample containing Fe was dissolved in HNO_3 to oxidize Fe^{2+} to Fe^{3+} , after
removal of the excess oxidizing agent . KI in excess was added .The librated I_2 was titrated
with 0.075 M $Na_2S_2O_3$,the volume needed was 18.5 ml .Find the percentage of iron in the
sample. (Fe= 55.8 g/mole) **(6 marks)**

6- 50 ml of water was titrated with 0.01204M EDTA using EBT as indicator .If the volume of EDTA needed to reach the blue color was 31.63 ml . Calculate the total hardness of water (equivalent .to Ca and Mg) as ppm CaCO3 . **(5 marks)**

7- You are provided with 1.0 M CH_3COOH, 0.5 M CH_3COONa solutions. Find the volume taken from both solutions to prepare 100 ml solution of pH = 4. ($K_a = 1.85 \times 10^{-5}$) **(6 marks)**

8- **Calculate pH for the following mixtures:** **(6marks)**

   i-50 ml of 0.08 M HCl + 40 ml of 0.1 M NH_4OH.

   Ii-100 ml of 0.025 M NaOH + 200 ml of 0.025 M CH_3COOH.

9-   i- **Define only :** **(4marks)**

   a- Coplexometric titration,   b- Precipitation titration,   c- Redox titration

   d-   Indicator   e-   End-point in titration

   ii-Why buffer solution resist the change in the pH when small amount of strong acid or

   strong base is added to it? **(4 marks)**

Examiner: Prof. Dr. Mohamed El- Defrawy .   Good luck