Assiut University **Date: 9-6-2019**

Faculty of Science **Time: 2h**

Chemistry Department

Final Fertilizer Industry Chemistry Examination (Chem300)Third Year Industrial Students.

Answer the following questions:(50 M)

Question No.1(10M)

1)Write four methods for determination of reactivity of rock phosphate.(2.5M)

2) All ammonia syntheses are based on the following reaction :

$\frac{1}{2}N_{2(g)} + \frac{1}{2}H_{2(g)} \rightarrow NH_{3(g)}$. Write the steps for ammonia syntheses.(7.5M)

Question No.2(10M)

1) Choose the correct answer:(2.5M)

a) The emission of sulfur dioxide gas according to the Egyptian Environmental Law 2015 equal (1500-800-450) mg/m^3 in production of H_2SO_4 acid by contact process.

b) The emission of fluorine gas according to the Egyptian Environmental Law 2015 equal (15-5-20) mg/m^3 in production of SSP .

2) Explain how sulfuric acid is produced by contact prosess and write the equation of the reaction.(7.5M)

Question No.3(10M)

1)Write the structure of pure fluorapatite .(2.5)

2)There are two methods for production of phosphoric acid explain one of these methods with equation. (7.5M)

Question No.4(10M)

1) Write the equation for production of these fertilizers:

Di-ammonium phosphate(DAP)-Mono-ammonium phosphate(MAP)-Single superphosphate(SSP)-Potassium sulfate – انظر خلفه

Triple superphosphate(TSP)- Ammonium sulfate (AS)-Ammonium Nitrite (AN).(7.5M)

2)Write the conditions Process operating variables in urea production.(2.5M)

Question No.5 (10M)

1) What is the purpose of Primary and Secondary reforming for ammonia production. (2.5M)

2) What is the advantage of direct granulation of TSP. (2.5M)

3) Write the basic chemical reaction involved in production of triple superphosphate(TSP). (2.5M)

4) Write the reaction mechanism of V_20_5 catalyst using in production of H_2SO_4 by contact process. (2.5M)

Good luck Dr. Atef .H. Ali

Assiut University
Faculty of Science
Chemistry Department

May:2019
Time:3 hrs

Final Examination of C-324 (Inorganic Chemistry III) for Third Level Students

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Answer the following questions:

A) Answer Only Four of the following: **(17 Marks)**

1-i- Using VBT predict the type of hybridization involved , geometry and magnetic moment of the following: $[MnF_4]^{2-}$, $[Ag(CN)_2]^-$, $[V(H_2O)_6]^{3+}$

ii- Calculate total pairing energy $3d^6$ ion in HS and LS octahedral fields.

2-i- Determine the number of unpaired electrons in a strong and weak octahedral fields of $3d^8$ and $3d^4$ ions.

ii- Write on the disadvantages of CFT and advantages of MOT.

3- On the basis of CFT explain the given values of magnetic moment of the following complexes: $[Co(NH_3)_6]Cl_3$=0.0 B.M $K_3[FeF_6]$=5.9 B.M

4- Identify the ground spectroscopic terms of the Cu^{2+} , Cr^{3+} , Mn^{2+} ions and correlate their splitting in a weak octahedral field.

5- Derive the relationship between stepwise and comulative stability constants of a complex ion in aqueous solution.

B) Answer Only Four of the following: **(17 Marks)**

1- Draw the molecular orbital bonding diagram of $[CoF_6]^{3-}$ ion.

2- Predict the different d-d transitions in $[Ti(H_2O)_6]^{3+}$ and $[V(H_2O)_6]^{3+}$ complex ions.

3- On the basis of VBT show that $[Ni(CN)_4]^{2-}$ is diamagnetic but $[NiCl_4]^{2-}$ is paramagnetic.

4-i- $[Co(NH_4)_6]^{3+}$ ion has a maximum absorption at 33,883 cm^{-1} , calculate the CFSE of this ion.

ii- Which complex ion of the following pairs is more stable:

$[Co(NH_4)_6]^{3+}$, $[Co(NH_3)_6]^{2+}$

$[Cu(NH_3)_6]^{2+}$, $[Cu(NH_3)_4]^{2+}$

5- Which of the following geometries can Ni(II) complex ion be diamagnetic : Inner orbital octahedral , outer orbital octahedral , tetrahedral or square planar? (Atomic numbers):

Mn=25 , Ag=47 , V=23 , Co=27 , Fe=26 , Cu=29 , Cr=24 , Ti=22 , Ni=28

"أنظر خلفه"

C) Give reason(s) for <u>only eight</u> of the following:

1- It is not easy to separate the lanthanide compounds by classical chemical methods.

2- In comparison to the lanthanides , the actinides give much mote oxidation states.

3- The magnetic moments of Ln^{3+} ions are higher than those of the corresponding transition metal ions having the same number of unpaired electrons.

4- Colours of Ln^{3+} ions are faint.

5- It is easy to separate cerium from monazite ore.

6- The lanthanides are used for the calibration of spectroscopic apparatus.

7- Heavier lanthanide ions from more stable complexes than lighter ones.

8- In the solid state the majority of lanthanide hydrides conduct electricity.

9- The lanthanide elements do not from as many stable carbonyl complexes as the 3d transition metals.

10- For only few lanthanides oxidation states II and IV are stable.

Good Luck

Examinars: Prof.Dr.Asmaa Ibrahim **Dr.Zaher Khafagy**

Faculty of Engineering
Assiut University
2nd Semester – Final Exam
2018/2019 – June, 2019
Time: 2 Hours
Marks: 50

Industrial chemistry Program
Course: Industrial Pollution Control and Industrial safety
code: Chem 400
3 rd level, – **bylaw:**

Important remarks	**This exam measures** • **A.7, b4, c1,, d3, d12** **No. of pages: 1 - No. of questions: 2**

Answer the following questions:

First question: (25 marks equally divided)

1- What are the main sources of errors when sampling in still air?
2- Determine The efficiency of a cyclone having the following characteristics for particles of 5 μm in diameter with density of 2000 kg/m3,:
Cyclone diameter = 2.0 m, b = 0.50 m, h = 0.80 m, L1 = L2 = 4 m, $\mu = 2 \times 10^{-5}$ Kg/m. sec, Ne=8, Q = 10 m3/s.
3- A fabric filter is be constructed using bags that are 0.4 m in diameter and 8.0 m long. The baghouse is to receive 20 m^3/s of air, and the appropriate filtering velocity has been determined to 2.0 m/min. Determine the number of bags required for a continuously cleaned operation.
4-Discuss the main operating problems when using bag filters for dust control?
5- What are the main categories of the threshold limit values for the exposure of air pollutants?

Second question:

1- A power plant burns 3 ton of fuel per hour and discharges the combustion products through a stack. The fuel has 4 % S and the wind speed at 10 m above the ground of the stack is 2.5 m/sec. The atmospheric stability class is (C). Determine the ground- level concentration of SO_2 at a distance of 3000 m from the stack at which the maximum concentration occurs. If the factor p is 0.2 and
$[\sigma_y = 0.22x\ (1.0 + 0.0004x)^{-0.5}$ and $\sigma_z = 0.20x]$, (8 marks)

2- What are the main air pollution quantities that should be measured? (5 marks)
3- What are the main properties that should be taken when selecting the filter media? (4 marks)
4- What are the main problems facing the electrostatic precipitators? (4 marks)
5- The device that used to measure the dust concentration along with the size distribution is
i. Anemometer ii. Cascade impactor iii. Dusttrak iv. Personal sampler (4 marks)

With all best wishes

Prof. Mohamed Abuel-kassem Mohamed M. Abuel-Kassem

Assiut University **May 2019**
Faculty of Science **Time allowed: 3 hours**
Chemistry Department **Second Semester**

Physical Chemistry III Examination (C-332) for Third Level Students

Answer all the following questions (I, II and III): ***(50 Marks)***

I) Answer *Only Three* from the following: **(17 Marks)**

A) From Maxwell-Boltzmann distribution law deduce an expression for the average speeds of a gas molecules.

B) For a Laminar flow, derive an expression for viscosity of incompressible liquid, then show how this relation can be modified for gases.

C) Calculate the fraction of nitrogen molecules at 27 °C and 1 atmosphere pressure whose speeds are in the range of $C_{mp} - 0.01\ C_{mp}$ to $C_{mp} + 0.01\ C_{mp}$.

D) i- Explain briefly the effects of temperature and pressure on the thermal conductivity coefficient.

ii- Calculate the collision properties L, Z_1 and Z_{11} for oxygen ($d = 2.93 \times 10^{-8}$ cm) at 27 °C and pressure of 101325 Pa.

($R = 0.082$ atm. L K^{-1} mol^{-1}, 8.314 J K^{-1} mol^{-1}, 1.987 cal K^{-1} mol^{-1}, $N_A = 6.02 \times 10^{23}$, atomic weight of nitrogen = 14, oxygen =16)

II) A) Answer *Only Two* from the following: **(8 Marks)**

i) Confirm that the allowed wavelengths for a particle moving in one dimensional box is given by the relation $\lambda = \frac{2a}{n}$ where a in the length of the box.

ii) Calculate the wavelength for each of the following;

1- Tennis ball has weight 65.0 g moving with velocity 45.0 ms^{-1}.

2- Electron with kinetic energy 205 eV.

What do you deduce from solution of this problem?

iii) Calculate the ground state energy and its accompanied wavelength for an electron moving in a linear molecule with length 0.77658 nm.

⇒ TURN OVER

B) If $\Psi = Ce^{im\varphi} + D\,e^{-im\varphi}$ is a solution for Schrödinger equation for a microscopic particle moving in a circle with radius r. Confirm that the rotational energy for that particle is quantized and equal to $m^2\frac{\hbar^2}{2I}$.

(note: $e^{ix} = \cos x + i \sin x$) **(8.5 Marks)**

Constants: $h = 6.626 \times 10^{-34}$ Js, $m_e = 9.11 \times 10^{-31}$ kg, $e = 1.602 \times 10^{-19}$ C

$$\nabla^2 = \left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}\right) = \frac{1}{r^2}\frac{\partial}{\partial r}r^2\frac{\partial}{\partial r} + \frac{1}{r^2\sin\theta}\frac{\partial}{\partial\theta}\sin\theta\frac{\partial}{\partial\theta} + \frac{1}{r^2\sin^2\theta}\frac{\partial^2}{\partial\phi^2}$$

III) Answer *Only Five* of the following questions: **(16.5 Marks)**

A) Find the frequency at which a proton NMR spectrometer should be operating under a magnetic field 1.8 T.
($g_N = 5.449$, $\mu_N = 5.0504 \times 10^{-27}$ JT^{-1}, $h = 6.626 \times 10^{-34}$ Js)

B) Write the rule of mutual exclusion, and show when **CS_2** molecule will be infrared active and when Raman active.

C) Which of the following molecules can show pure rotational or vibrational spectra, and which can show rotational or vibrational Raman spectra.

Cl_2, CCl_4, HF, $H_2C = CH_2$, H_2O, C_6H_5OH, BF_3, SO_2, N_2, SiH_4

D) Explain, how the electron charge cloud around an atom or molecule is distorted, when UV-Vis light is absorbed or emitted by the atom or molecule.

E) Calculate the degrees of freedom for acetate ion and draw its vibrational modes.

F) The ESR frequency for a free electron is 9000 MHz. Calculate the magnetic field at which the ESR spectrometer is working.
(Bohr magneton $\beta = 9.273 \times 10^{-24}$ JT^{-1}, g value = 2)

With Our Best Wishes

Examiners:- ***Prof. Dr. Maher Mohamed Ahmed Hamed***
Dr. AbdelRahman AbdelMonem Dahy
Dr. Mostafa Farrag Mostafa

Assiut University
Faculty of Science
Chemistry Department

Final exam

Chem 302 (Corrosion chemistry) **second semester 2018-19** **Time: 2 hours**

Answer *Five only* from the following:

Q1 : Complete the following (*10 marks*)

1- Contamination of the product is a .....

2- Inhibitor is a.....

3- SCC is a.....

4- The Pourbaix diagram is a .....

5- The Pourbaix diagram is used to predict of.....

6- One limitation of the Pourbaix diagram is.....

7- The amount of substance changed during electrochemical reaction proportional to.....

8- The polarizable electrode is .....

9- The two polarization method are..... and .....

10- Three causes of crevice corrosion are ....., ... and .....

Q 2: a) The corrosion current for a pure iron in an acid solution is 0.25 mA cm^{-2}, calculate the corrosion rate in mpy (for iron; density = 7.85 g cm^{-3} , At .wt = 55.85). (5 marks)

b) What are the possible cathodic reactions which might occur during corrosion? (5 marks)

Q3: a) Writ on: pitting corrosion – Dealloying (5 marks)

b)) If the hydrogen overvoltage (η_{H2}) for iron in Q2(a) is 0.15 V, using Tafel equation calculate the exchange current density for h.e.r., assume $\beta_c = 0.1$. (5 marks)

Q4: a) How dust particles enhance atmospheric corrosion rate? (5 marks)

b) What volume of chlorine gas, measured at STP, evolved from salt solution electrolysis by passing 2 A for one hour? (F = 96485 C mol^{-1}) (5 marks)

Q4: Explain the protection against corrosion by change of metal potential. (*10 marks*)

Q5 a) What are the types of polarization (overvoltages)? (*4marks*)

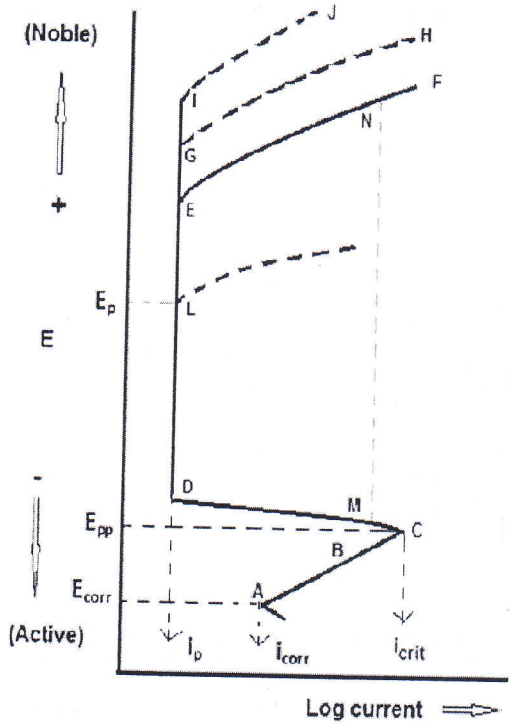
b) The linear polarization slope at low current densities for iron in a corrosive solution is 0.01 mV/μA cm^{-2}, calculate the corrosion rate in mdd given that Tafel constants equal 0.1 V and m_e of iron = 0.2893 mgC^{-1}. (*6marks*)

(انظر بـــالخلف)

Q6: you are provided with the following anodic polarization diagram for a metal in a given corrosive medium:

i) Explain the points and lines represented by characters A, B, C,.... (*6 marks*)

ii) Define the potentials and currents appeared in the diagram. (*4 marks*)



مع اطيب التمنيات بالتوفيق..

الاستاذ الدكتور/ أبوالحجاج عبدالعزيز هرماس

الدكتور/ مصطفى حسن وهدان

امتحان نهاية الفصل الدراسي لجميع المستويات المقرر: أخلاقيات المهنة والسلامة المهنية رقم المقرر ورمزه: F300	جامعة أسيوط كلية العلوم كلية العلوم	الزمن: ساعتان ٢٣ مايو ٢٠١٩ الاجابة في نفس ورقة الاسئلة

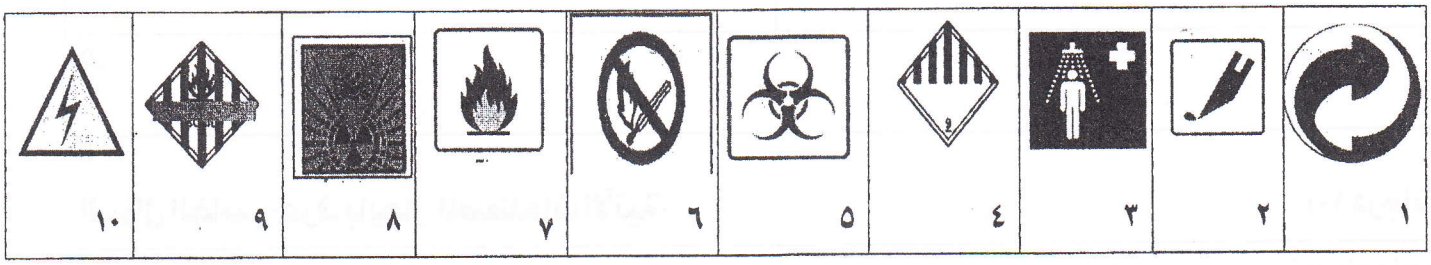
أجب عن الأسئلة التالية:

السؤال الأول :

أ- ضع علامة ✓ أو X امام العبارات التالية: (٥ درجات)

١- أخلاقيات المهنة مسألة دينية فقط تخص علاقة العبد بربه . ( )
٢- من شروط السلامة في المنشآت الصناعية وضع العلامات الارشادية بالعربية والانجليزية. ( )
٣- التدريب على اعداد ميثاق اخلاقي للمهنة في العمل من أهداف المقرر. ( )
٤- انت قدوة بافعالك شئت ام ابيت قصدت ام لم تقصد فالاخرين يتأثرون بأفعالك وقد يقلدونك . ( )
٥- يجب وضع إناء مملوء بالرمل تحت أوعية حفظ المواد الكيميائية لامتصاص المياة المنسكبة. ( )
٦- الأمانة والسلامة والصدق من أخلاقيات البحث العلمي . ( )
٧- لإطفاء حرائق الزيوت والسوائل يجب استخدام طفايات حريق من نوع CO_2 . ( )
٨- الالتزام بمعايير الجودة من الأخلاقيات الهامة لأي مهنة . ( )
٩- من مواصفات التقرير المهني الجيد ان يكون له بعد زمني ودقيق وصحيح البيانات . ( )
١٠- المواليد المستنسخة تعيش عادة لفترة أطول . ( )

ب- اكتب مدلول علامات التحذير والسلامة التالية: (٥ درجات)



السؤال الثاني: من الضروري ان يكون لكل مؤسسة او هيئة ميثاق اخلاقي مهني يتكون من عدد من المواد (البنود).
اكتب عشرة من المواد (البنود) المشتركة التي يمكن أن تتضمنها أية مواثيق أخلاقية مهنية : (١٠ درجات)

١-	٢-
٣-	٤-
٥-	٦-
٧-	٨-
٩-	١٠-

السؤال الثالث:

أ-من المهارات المهنية التي يخرج بها دارس هذا المقرر: (٤ درجات)

١- ٢-

٣- ٤-

ب-اكتب ستة من انواع السرقات العلمية: (٦ درجات)

١-	٢-
٣-	٤-
٥-	٦-

السؤال الرابع:

أ- عدد خمسة من المنافع المترتبة على الالتزام الأخلاقي (٥ درجات)

١-	٢-
٣-	٤-
٥-	

ب-أكتب خمسة من الاهداف العامة التي تسعى السلامة والصحة المهنية الى تحقيقها: (٥ درجات)

١-	٢-
٣-	٤-
٥-	

السؤال الخامس: عرف بايجاز المصطلحات الآتية: (١٠ درجات)

Plagiarism:
MSDS:
Safety Symbols:
Code of Ethics:
LC50:

انتهت الأسئلة مع تمنياتي بالتفوق أ.د. ناصر الشيمي

Assiut University
Faculty of Science
Chemistry Department

Time : 3 hours
Date: May, 2019

Final Examination of Natural Products and Biochemistry for 312C Students

Answer the following questions:

Section I: Natural Products Chemistry **(25 Marks)**

1.Write on *FOUR* only of the following: **(8 Marks)**

a) Starting with β-ionone, synthesis of Vit. A2.
b) Conversion of quinolone into 2-propenyl benzene.
c) Prove by equation that piperonylic acid is 3,4-methylene dioxy benzoic acid.
d) Conversion of DEA into progesterone.
e) Starting with cholesterol, preparation of pyridazine derivatives.

2. Discuss *FOUR* only of the following: **(9 Marks)**

a) Discuss by equation that decarboxylation takes place easily when the COOH group is α- to *N*-atom than that of β-position
b) Write by equation the relation between metahemipinic acid, 2,3,4- tricarboxylic acid pyridine and 6,7-dimethyl isoquinoline 1- carboxylic acid.
c) Ozonolysis of sequlene gives the following compounds:
   i) 2 mole of laevulic acid and 2 mole acetone.
   ii) 4 mole laevulic acid, acetone and formaldehyde.
   iii) 4 mole laevulic acid and 1 mole acetone.
   iv) All the pervious.
d) Conversion of naphthalene into Diels's hydrocarbon.
e) Prove by equations that nicotine has two moieties pyrrole and pyridine.

3. Explain FOUR only of the following points: **(8 Marks)**

a) prove that ergosterol have conjugated bonds at ring (B)
b) Starting with ethyl propyl ether, synthesis of nicotine.
c) Starting with phenol, preparation of piperic acid.
d) Prove by equation that adrenaline containing catechol unit.
e) Oxidation of α-terpineol.

بقية الأسئلة خلف الورقة

Section II: Biochemistry *(25 Marks)*

Answer the following questions:

1. Discuss the use of ***eight*** of the following reagents or techniques in biochemistry: **(8x2 = 16 Marks)**

   a. Acetic anhydride.
   b. Boric acid.
   c. Periodic acid.
   d. Sanger's reagent.
   e. Dimethylsulphate.
   f. Ninhydrin.
   g. Biuret test.
   h. Nitrous acid.
   i. Sorensen titration.

2. Answer (A) *or* (B): **(9 Marks)**

   (A) Distinction between the following pairs:
   - I. Viscose and nitrate silk.
   - II. Maltose and sucrose.
   - III. Glyceryl trioleate and glyceryl tristearate.

   (B) Discuss the elucidation of structure of Mannose.

مع التمنيات بالنجاح
أ.د. مرسى محمد على
أ.د. عبدالعال جابر

Assiut University

Faculty of Science
Chemistry Department
Final Examination for 2nd (Industrial Program) Industrial Polymer Chemistry (304 C)

Date: Thursday, 30/05/2019 Time: 2 hours

Answer **Eight** only from the following Questions: (50 points)

1) Explain briefly the: chemical structure, advantage and disadvantages for : i) Acrylonitrile-Butadiene-Styrene- Copolymer (ABS), ii) Acetal (POM, Polyacetal)
2) What are the three main types of degradable plastics? Why are they degradable?
3) What are the two types of polyethene? What is the structural difference between them?
4) Explain the term "vulcanization of rubber". What are the differences between natural rubber and vulcanized rubber?
5) What is a peptide linkage? Illustrate your answer with 2-amino-ethanoic acid ?
6) How does urea-methanal differ from nylon, Kevlar and Dacron, even though all of them are condensation polymers?
7) Why is the structure of DNA called a double helix? Name its component structure?
8) Why would a hole appear when a dilute alkali is spilt on a fabric made of Kevlar, discuss by mechanism equations ?
9) Write short note about the Bakelite, its properties, and uses?

Good Luck

Examiner:

Prof. Dr. Kamal I Aly

Assiut University

Faculty of Science
Chemistry Department

Final Examination for 2nd (Industrial Program) Industrial Polymer Chemistry (304 C)

Date: Thursday, 30/05/2019 Time: 2 hours

Answer **Eight** only from the following Questions: (50 points)

1) Explain briefly the: chemical structure, advantage and disadvantages for : i) Acrylonitrile-Butadiene-Styrene- Copolymer (ABS), ii) Acetal (POM, Polyacetal)
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9) Write short note about the Bakelite, its properties, and uses?

Good Luck

Examiner:

Prof. Dr. Kamal I Aly

Chemistry Department June 2019

Faculty of Science Time: 2h

Assiut University

Final exam for the 3rd level industrial program in " Glass industry, 310 C"

Answer the following (50 Marks)

1. Give reasons for **FOUR** of the following (12 Marks)
   - i) Annealing of glass articles
   - ii) Polyester is the preferred resin for wetting out chopped strand mat.
   - iii) Borosilicate glass is suitable for laboratory apparatus and kitchen wares that resist heat shock.
   - iv) Use of $NaNO_3$ and Na_2SO_4 in glass industry.
   - v) Glasswares made of lead oxide (crystal glass) look more brilliant than the normal glasses.

2. Mark with (✓) for the correct statement and with (X) for the false one (10 Marks)
   - i) Wired glass is fire resistant.
   - ii) GPR (glass- reinforced plastic) does not resist compressive or tensile forces.
   - iii) The strength of fiberglass depends on arrangement of the glass fibers.
   - iv) S-glass is characterized with high CaO content and low tensile strength.
   - v) Potash- lime glass is less affected by acids and alkalies than soda-lime glass.

3. Complete the following (16 Marks)
   - i) Pultrusion process is used to produce.....of reinforced polymer with constant.....
   - ii) In the fiberglass manufacture the fiberization process involves a combination of.....and.....processes

انظر خلف إصفحة الثانية

iii) Glass container factories use three-part operations and they are....., ...and.....

iv) Toughened glass is processed by controlled .....or .....treatments.

v) Arsenic oxide is added during glass manufacture to facilitate removal of.....

vi) Upon glass break, radial cracks follow the 3R rule and give rib marks that make.....on the .....side from where the force was applied.

vii) Glass devitrification can be repaired by....., ...and.....

viii) ..... process in glass industry involves the flow of molten glass onto the surface of a molten tin bath.

4. i) Give the chemical reactions occurring during glass manufacture.

ii) Write on the difference between thermoplastics and thermosets materials.

iii) Write briefly on the environmental impact of glass industry regarding the atmospheric emissions.

(12 Marks)

Good Luck

Examinar: Prof. Dr. Aref A. M. Aly

Assiut University
Faculty of Science

Date: june 2019
Time Allowed: 3 hours

Chemistry Department

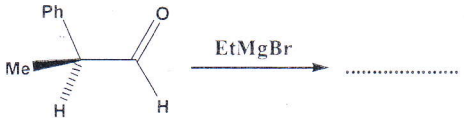
Final Exam of advanced synthetic Organic Chemistry for 3rd chemistry students (**314 C**)

****

Answer the following questions:

Q1) Write by equations on (**Four-Only**) the following: **(12 Marks)**

a- Using Chair-Like Transition state explain the formation of Cis and Trans Li enolate
b- Using Felkin-anh model give the products of this reaction and explain that de = 50%.



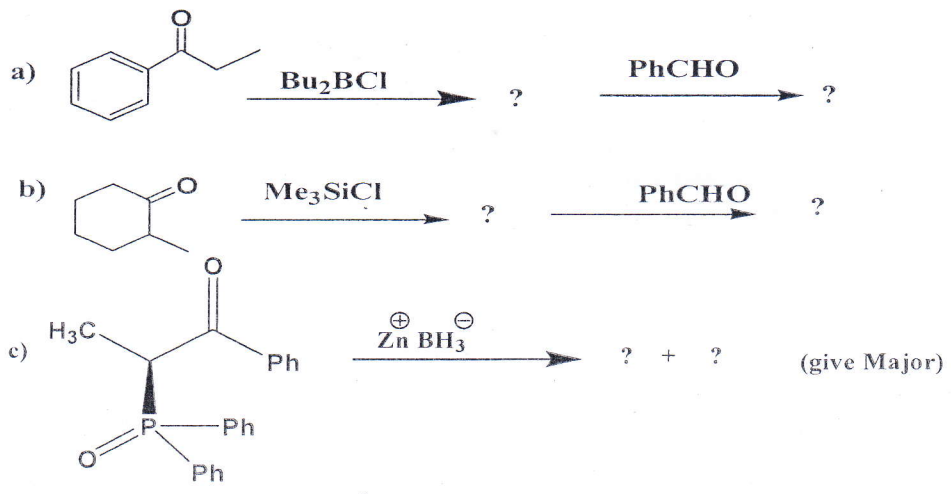
c- Birch reaction of 2-methyl benzoic acid .
d- Moffat oxidation mechanism of isopropanol
e- Two methods of amines protections

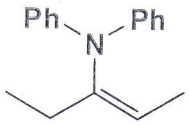
****

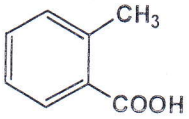
Q2) Put the sign (√) in the front of correct statement and (X) in the front of wrong statement . **(12 Marks)**
(Correct the wrong statement)

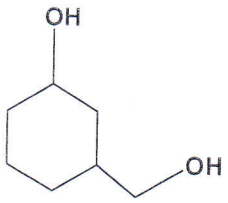
a) In the nucleophilic addition to Ketones the smaller nucleophile give rise to greater distereoselectivity.
b) Heterogenous catalyst are not easier to remove from the reaction mixture.
c) Diisopropyl ketone gives only kinetic enolate
d) Reduction of ethylacetoacetate using $NaBH_4$ is a type of regioselectivity
e) Dicyclohexyl Boron chloride is a catalyst for the formation of cis Boron enolate
f) Wilkinson Catalyst reduce only the less hindered alkenes
g) Fetizon reagent is very selective oxidation of benzylic alcohols
h) Lindlar catalyst used to reduced alkynes to alkane
i) The reaction of aldehyde or ketones with 1st. amines give imines
j) BOC reagent is used to protect carboxylic acid group.
k) An electronegative group and a metal, activates the attack on C=O group and can reverse selectivity
l) Reaction of methylbutanoate with LDA/THF and HMPA gives trans enolate

Q3) Complete the following equations (draw the stereochemical in products if found) **(10 Marks)**

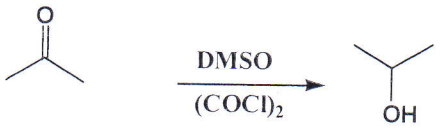


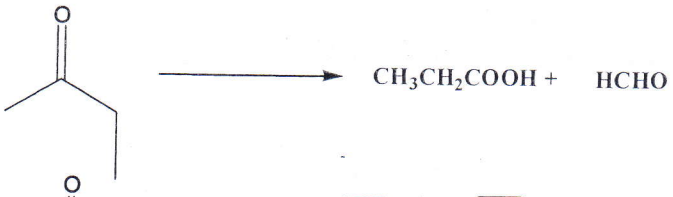
d)  $\xrightarrow[H_3O^+]{CH_3I}$?

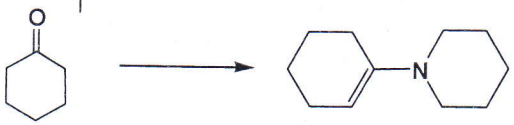
e)  $\xrightarrow{Li/NH_3}$?

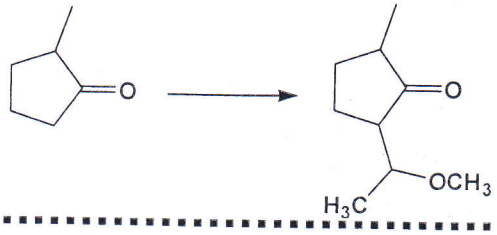
f)  $\xrightarrow[DMF]{PDC}$?

Q4) Write mechanisms for the following transformations **(16 Marks)**

a) 

b) 

c) 

d) 

Good Luck
Prof. Dr. Shawkat

Assiut University
Faculty of Science
Chemistry Department

Chem 334 (Corrosion chemistry) Final exam second semester 2018-19 Time: 3 hours

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Answer ***Five only*** from the following:

Q1 : Complete the following (*10 marks*)

1- According to Faraday's law, the rate of corrosion per unit time is proportional to .....
2- If you put a piece of tin (Sn) in a copper salt solution the reaction is.....
3- Corrosion engineering is .....
4- The main two polarization methods are..... and .....
5- The lost of appearance (unpleasant view) for a structure is .....
6- Regions of the same metal and electrolyte with different temperatures are.....cell.
7- Activation polarization is caused by .....
8- The scratched area is ..... and the rest of metal .....
9- A direct lost of corrosion like.....
10- Wet corrosion is .....

Q 2: a) "mpy" is a corrosion rate unit, what is this unit meaning? The corrosion current for a pure iron in an acid solution is $5x10^{-4}$ mA cm^{-2}, calculate the corrosion rate in mpy (for iron; density = 7.85 g cm^{-3} , At .wt = 55.85). (4marks)

b) i)) If the hydrogen overvoltage (η_{H2}) for iron in Q2 (a) is 0.11 V, using Tafel equation calculate the exchange current density for h.e.r., assume β_c = 0.1. (3 marks)

ii) Explain: The term of "exchange current" - The possible cathodic reactions in the corrosion process. (3 marks)

Q3:a) Discuss the basic causes of corrosion. (5 marks)

b) On cathodic polarization at 0.001 A cm^{-2} the potential of a steel specimen E_{pol} = - 0.911 V vs. SCE in a solution of pH 3. Calculate the hydrogen overvoltage η_{H2}. Indicate your answer on polarization diagram and given $E_{sat,calomel}$ = 0.241 V vs. SHE. (5 marks)

Q4 a) Discuss how alterations of environment decrease the chance of metal corrosion. (4 marks)

b) Write on: Galvanic corrosion – Pitting corrosion – Coatings (6 marks)

Q5 a) Define the corrosion inhibitor, explain the types of inhibitors and the use of Tafel lines to study the inhibition effects. (6 marks)

b) Explain the cathodic protection method. (4 marks)

Q6: a) Describe the anodic polarization (active-passive) curve of a metal electrode in a corrosive solution and define the following terms: active dissolution region, passive range, E_{cor}, E_{pp}, E_p , I_{crit} and I_p, indicate these parameters on the curve. (6 marks)

b) Write short note about: Errosion corrosion - Soil corrosion (*4 marks*)

مع اطيب التمنيات بالتوفيق..

الاستاذ الدكتور/ أبوالحجاج عبدالعزيز هرماس

الدكتور/ مصطفى حسن وهدان

Assiut University Faculty of Science Chemistry Department	Second Semester Final Examination Analytical Chemistry (1) (C-342) Third Level (Credit Hours System)	June 2019 Time: 2 hour

Section (A) (25 Marks)

Answer Only Five from the Following Questions:

Q.1: (a) Which has the longer wavelength, light with a frequency of 7.84×10^{13} sec^{-1} or light with an energy of 5.13×10^{-13} erg.

(b) Write the instrumental deviation from Beer's law.

Q.2.: (a) Write a summary of the Inductively Coupled Plasma (ICP) technique.

(b) Write the continuous variation method to determine the complex formation reaction

Q.3: (a) Discuss the determination of Iron in water samples by A. A. analysis using standard addition method.

(b) Write the exact mechanism of excitation process in the hallow cathode lamp.

Q.4: Draw single beam spectrophotometers and write the advantages and disadvantages of each of single and double beam spectrophotometer.

Q.5: Define each of the following: Hypochromic effect, Hypsochromic shift, Absorptivity, Molar absorptivity and Wave number

Q.6: Draw the graphite furnace atomizer and write its advantages and disadvantages

Section (B) (25 Marks)

Answer Only Three from the Following Questions:

Q.1: (a) Write on advantages of solid electrodes based on carbon (Give examples)

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(b) Define amperometry and write on the principle of electrochemical biosensor (Give an example).

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Q.2: **(a) The drug Clonazepam (CZP) gives an adsorptive striping voltammetric peak at a carbon-paste electrode. A 50.0 mL sample containing CZP yielded a peak height of 0.37 µA. When 2.0 mLof 3.0 µM CZP was spiked to the sample, the peak increased to 0.80 µA. Find the concentration of Clonazepam in the sample.**

(b) Write on role of auxiliary electrode: (with drawing)

(c) Write on Heyrovsky-Ilkovic equation:

Q.3: (a) Write factors contribute to the rate of the electrochemical reaction and discuss modes of mass transport

(b) Write on polarizable electrodes:

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

1) Supporting electrolyte is a reactive electrolyte used in electrochemical cells ☐
2) Due to Hg is oxidized; it restricts the use of electrode as cathode ☐
3) Current is sampled twice in differential pulse polarography ☐
4) Working electrode should possess high signal-to-noise ratio characteristic ☐
5) For reversible systems Ep_a and Ep_c are independent of the scan rate ☐
6) Square wave voltammetry is more sensitive than normal pulse polarography ☐

(b) Write on deposition, stripping steps and advantages of stripping voltammetry

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

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Good Luck

Examiners: Prof. A.H.Ibrahim & Dr. Hossieny Ibrahim

Assiut University

Special program
Industrial Chemistry
Final Exam 2018-2019

Ceramics Industry
Time: 2 Hours

Faculty of Science

Answer the following questions
The second paper includes all data needed for calculations

Question NO. 1 (12 points).

a- What are the main classes of ceramic materials? Give example for each.
b- What are the main characteristic properties of ceramic materials? Compare between properties of ceramics and different engineering materials
c- What are the major raw materials for both traditional and advanced ceramics?

Question NO. 2 (13 points).

a- Compute the percent ionic character of the interatomic bonds for the following compounds: GaP, CdS, and FeO. Which one is closer to be a ceramic material?
b- What is the vitrification process? In what type of ceramic materials does vitrification take place?
c- Why is it so important to control the rate of drying of a ceramic body that has been hydroplastically formed or slip cast? Cite three factors that influence the rate of drying, and explain how each affects the rate.

Question NO. 3 (15 points).

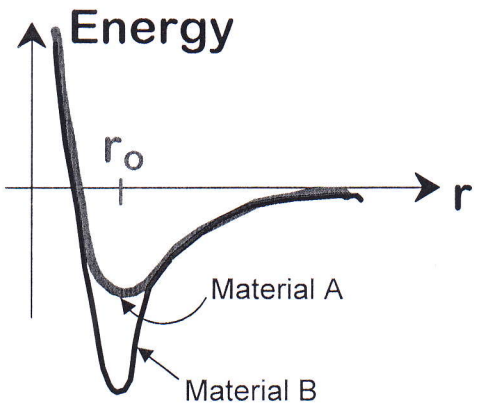
a- Discuss different types of refractories.
b- On the basis of ionic radii, what crystal structure do you predict for FeO?
c- If you are given 2 materials A and B (as shown in Figure in next page), compare between them in terms of melting point, modulus of elasticity, and coefficient of thermal expansion.

Question NO. 4 (10 points).

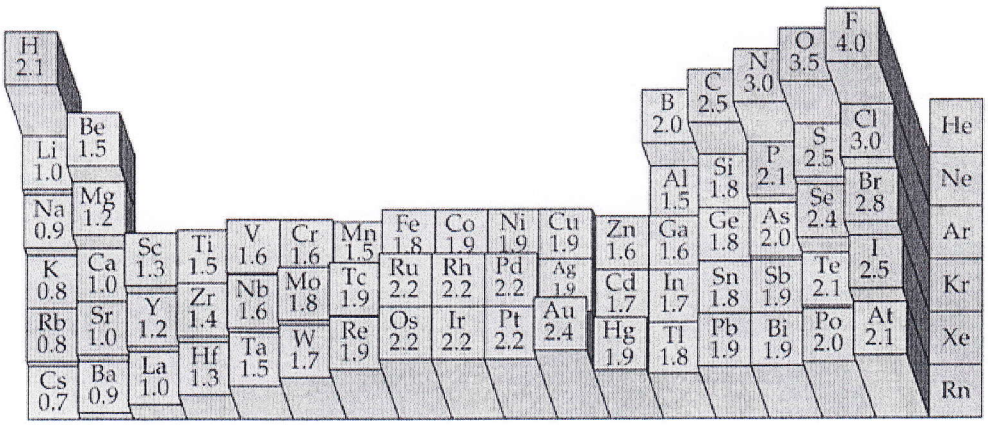
a- Show that the minimum cation-to-anion radius ratio for the coordination number 3 is 0.155.
b- Explain with sketches the powder pressing process for ceramic materials.

Figures in next page

$$\%IC = \{1 - \exp[-(0.25)(X_A - X_B)^2]\} \times 100$$



Cation	Ionic Radius (nm)	Anion	Ionic Radius (nm)
Al^{3+}	0.053	Br^-	0.196
Ba^{2+}	0.136	Cl^-	0.181
Ca^{2+}	0.100	F^-	0.133
Cs^+	0.170	I^-	0.220
Fe^{2+}	0.077	O^{2-}	0.140
Fe^{3+}	0.069	S^{2-}	0.184
K^+	0.138		
Mg^{2+}	0.072		
Mn^{2+}	0.067		
Na^+	0.102		
Ni^{2+}	0.069		
Si^{4+}	0.040		
Ti^{4+}	0.061		



LIMITING RADIUS RATIO FOR VARIOUS TYPES OF CRYSTAL STRUCTURE				
r/R	CN	Structural arrangement	Arrange of anions around the cation	Example
0.15 – 0.225	3	Trigonal	Corners of equilateral triangle	Boron oxide
0.225 – 0.414	4	Tetrahedral	Corners of a tetrahedron	ZnS
0.414 – 0.73	6	octahedral	Corners of an octahedron	NaCl
0.732 – 1.000	8	Cubic	corners of a cube	CsCl

End

Best Wishes *Dr. M. Aboraia*

Assiut University

Applied Industrial Chemistry Program
2018-2019 Final-Term Exam
Course Title :Instrumentation &Process Control
Course Code: Eng 300
Time: 2 hours
Date:

Faculty of Science
Chemistry Department

Answer The Following Questions

Question # 1:(8X1= 8 points)

Choose the correct answer from a, b, c, or d

1. A thermocouple is a transducer that converts:
   (a) Temperature to resistance. (b) Temperature to voltage.
   (c) Analog signal to digital signal. (d) Pressure to displacement.

2. A thermistor is a transducer that converts:
   (a) Temperature to resistance. (b) Temperature to voltage.
   (c) Analog signal to digital signal. (d) Pressure to displacement.

3. LVDT is a device that converts:
   (a) Temperature to resistance. (b) Temperature to voltage.
   (c) Displacement to electrical signal. (d) Pressure to displacement.

4. Bourdon tube and bellows convert:
   (a) Temperature to resistance. (b) Temperature to voltage.
   (c) Analog signal to digital signal. (d) Pressure to displacement.

5. Hygrometers or psychrometer is a transducer that produces output signal based on :
   (a) Flow rate. (b) Temperature.
   (c) Relative humidity. (d) Pressure.

6. .....is used for measuring very high temperature without physical contact with object to be measured.
   (a) Gas sensor (b) Pressure sensor.
   (c) Level sensor. (d) Radiation pyrometer.

7. Three applications for ultrasonic transducers in industry are:
   (a) Level, temperature, and flow. (b) Light intensity, pressure, and level.
   (c) Pressure, level, and temperature. (d) Flow detection, cleaning, and level.

8. The .is used for measuring the flow rate of the conducting fluid:
   (a) Temperature sensor. (b) Thermistor.
   (c) LVDT. (d) Magnetic flow meter.

...stion # 2:(20 points)

[1] Why is process control necessary?

[2] Define the following terminologies:

i. Chemical process,
ii. Control,
iii. Transducer,
iv. Actuator
v. Sensor
vi. Accuracy, and resolution

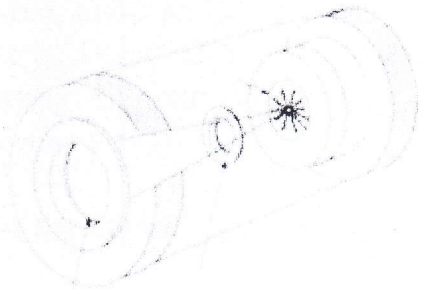
[3] What are the operation principles of the following thermal sensors: RTD, Thermistor, and Thermocouple?

[4] Explain the operation principle of the ON/OFF control system for controlling the room temperature.

Question # 3:(10 points)

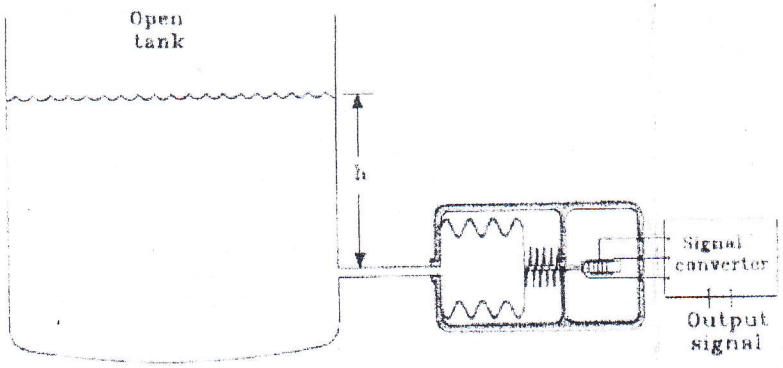
a. A sensor resistance changes linearly from 100 to 200 Ohm as pH changes from min to max values. Find a linear equation relating resistance and the pH. What is the sensor resistance value for neutral substance?

b. Explain the operation principles of the shown transducer and complete the figure data. What is its application?

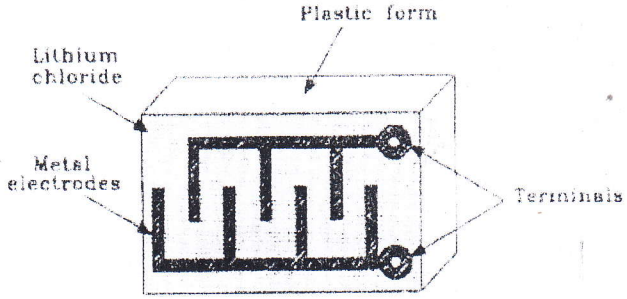


Question # 4:(12 points)

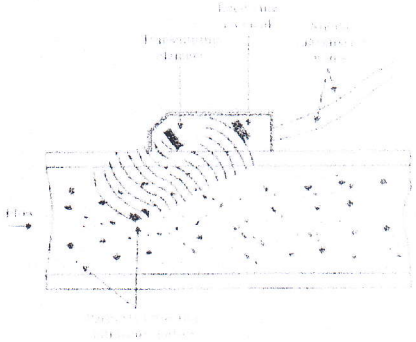
a. Explain the function of the level measurement system shown.



Name the transducer shown and explain its operation and application.

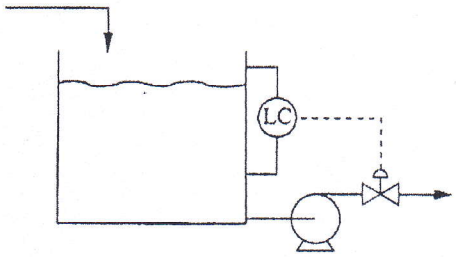


c. What is the transducer shown? and explain its operation and application.



d. Many hazardous, corrosive, toxic and environmentally-unfriendly chemicals are used in the processing industry. These chemicals require careful monitoring during use, transportation, and handling. Explain briefly smoke and chemical measuring devices based on *Ionization Chambers* devices.

e. Explain the operations of the control system shown below. Draw the block diagram of the control system.



Best Wishes

Dr.-Ing.: Amer Abdelfattah Noureldin