Mansoura University
Faculty of Science
Chemistry Department
Subject: Analytical Chemistry
Course: Environmental Chemistry
Course code: Chem. 413

4th level (Zoology, Botany, Chemistry and Biochemistry)
Date:16/5/ 2015
Time allowed: 2 hours
Full Mark: 60 Marks

Answer the Following Questions:

Q1) Explain, what do you meant by (choose 5 only): **(15 marks)**

a) **Essential Limit and Toxic Limit for metal ions in water.**
b) **BOD and COD.**
c) **Types of organic pollutants.**
d) **Chemical speciation.**
e) **Heavy metals and trace element.**
f) **Applications of water reuse.**

Q2) Characterize the biochemical effect of each of the following and suggest antidotes for each: **(10 marks)**

a) **Carbon monoxide.**
b) **Cyanide.**

Q3) a) Discuss the mechanism of toxic chemicals on enzymes. (10 marks)
b) Write a note on methyl isocyanate (MIC). **(10 marks)**

Q4) Write short notes on each of the following: **(15 marks)**

a) **Incineration method of waste disposal.**
b) **Sanitary landfill method for waste disposal.**
c) **Main steps for anaerobic treatments for organic waste and biogas generation.**

Best wishes for success,

Prof. Dr. I. Kinawy, Prof. Dr. M. El-Defrawy, Dr. W. Abo El-Maaty and Dr. H. Moustafa

Mansoura University **Faculty of Science** **Chemistry Department** **Subject : Chemistry** **Course(s):** Chem (443) Molecular Spectroscopy.	كلية العلوم جامعة المنصورة	**Second Term** **Fourth year Students** **Special Chemistry-level 4** **Date : May 2015** **Time Allowed : 2 hours** **Full Marks : 80 Marks**

Answer the following questions :

1. a) Write on : Different tops of rotating molecules - angular momentum for rotation- kinetic energy of rotating molecules - determination of moment of inertia and bond length for rotational spectra – rotation and vibration periods.
(20 marks)

b)) Pure Microwave absorptions at 83.11, 89.118, and 95.11 6 GHz on flowing dibromine gas over hot copper .What transitions do these frequencies represent ? What is the bond length?
(10 marks)

2. a) Explain the vibration – rotation spectra for some molecules including the different types of bands their equations and types of electronic transitions forming electronic spectra. (15 Marks)

b) The microwave spectrum of CN shows a series of lines separated by 3.881 cm^{-1}. Calculate the moment of inertia and the internuclear distance in the molecule. (10 Marks)

3 . a)) Explain the vibration spectra of water and $-CH_2$ group. (15 marks)

b) Write and explain, force constant for vibrating molecules , Rayleigh ,Stokes and Anti- Stokes Raman lines (10 Marks).

($h=6.62\times10^{-27}$ erg .S, $N_A=6.02\times10^{23}$,atomic weights: C= 12, N =14,Br=79).

Prof. Dr. Esam Gomaa

Mansoura University **Faculty of Science** **Chemistry Department** **Subject : Chemistry** **Course(s) : Carbohydrates** **Code : Org. Chem. (434)**		**Second Term** **4th Level Students** **Date : 30 /05/2015** **Time Allowed : 2 hours** **Full Marks : 80 Marks**

Answer All The Following Questions

Question 1 [25 Marks]

A- Draw the Haworth projections for the following sugars. [10 Marks]

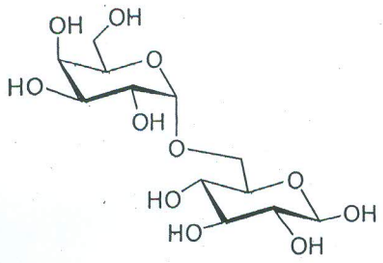
i) D-Glucuronic acid
ii) Methyl-β-D-allopyranoside
iii) Lactose
iv) Raffinose
v) 3-Deoxy-D-idose

B- How can you synthesize L-ascorbic acid from D- glucose ?[6 Marks]

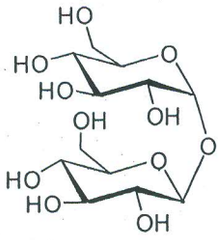
C- Using Ruff method , how can you convert D-talose to D-lyxose ? [5Marks]

D- Comment : Reduction of D-galactose leads to optically inactive alditol. [4Marks]

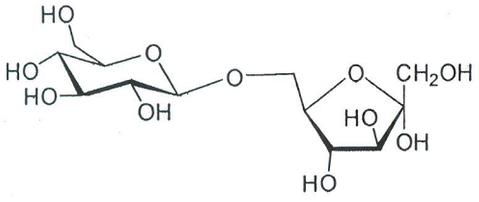
Question2 [23 Marks]



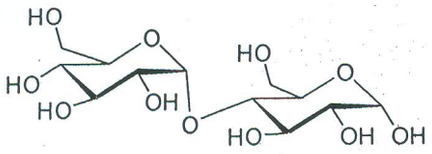
(1)



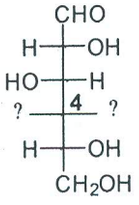
(2)



(3)



(4)



(5)

A- Describe the glycosidic bond in the disaccharides **(1) ,(2) & (3).** [6 Marks]

B- Classify sugars **(1) ,(2) & (3)** as reducing or nonreducing sugars . Do they undergo mutarotation ? [6 Marks]

C- The disaccharide maltose found in malt has structure **(4).** Show how can you elucidate the point of attachment in this sugar. [6 Marks]

D- Structure **(5)** represents partial structure of D-Glucose. Show how can you elucidate the stereochemistry at carbon atom number **4** . [5 Marks]

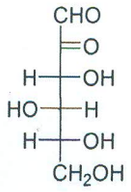
Question 3 [32 Marks]

A- Complete the following equations [21 Marks]

(i) D-altrose $\xrightarrow{3PhNHNH_2}$ ---------- $\xrightarrow[\Delta]{CuSO_4}$ ----------

D-altrose $\xrightarrow{3PhNHNH_2}$ ---------- $\xrightarrow{PhN=NCl}$ ----------

(ii)



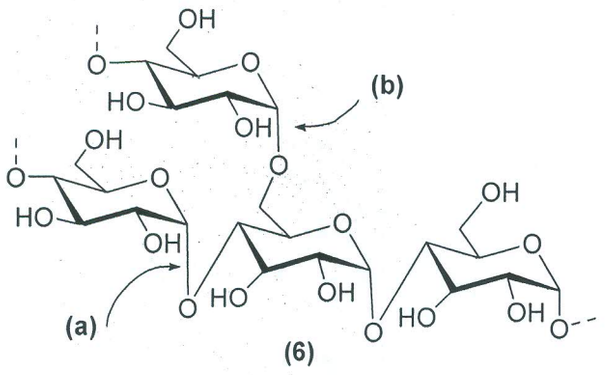
$\xrightarrow{Zn / HCl}$ ---------- $\xrightarrow{OH^-}$ ----------

(iii) α-D- galactopyranose $\xrightarrow{CH_3OH / HCl}$ ----------

α-D- galactopyranose $\xrightarrow{Acetone / HCl}$ ----------

(iv) ---------- $\xleftarrow{HNO_3}$ D-mannose $\xrightarrow[2) \text{ pyridine }, \Delta]{1) Br_2 / H_2O}$ ----------

B- Structure **(6)** represents partial structure of starch . Describe the glycosidic bonds **(a)** & **(b)** .Name the monosaccharide unit. [5 Marks]



(6)

C- Prove the ring size in D-Glucose using Jackson & Hudson (periodic acid oxidation). [6 Marks]

----------*With our best wishes*----------

Examiners

A.Prof.Eman Keshk *Dr.Soha M.Abdelmageed* *Dr.Eman Helmy*

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Inorganic Substitution Reactions** **Course Symbol :Chem. 423**		**Program: Chemistry** **Second Term** **Level: Fourth** **Date : 2/6/2015** **Time Allowed: 2 hours** **Full Mark : 80 Marks**

Answer the Following Questions:(each question 20 Marks)

Q1-I) ***Write short notes on only two of the following: -*** (15 Marks)

a) Labile complexes with examples.

b) π–bonding theory.

c) Garrick´s explanation for dissociation mechanism of the reaction:

$$[Co(en)_2(NO_2)_2]^+ + Cl^- \xrightarrow{(CH_3)_2SO,\ \text{piperidine}} [Co\,(en)_2\,NO_2\,Cl]^+ + NO_2^-$$

Indicate how fast the reaction is, order and mechanism type of the reaction.

II) Write the rate constant expression of the given reaction showing the possible Mechanism: (5 Marks)

$$[Pt(dien)Cl]^+ + OH^- \rightarrow [Pt(dien)\,OH^-]^+ + Cl^-$$

Q2) ***Complete the following statements:-*** (20 Marks)

a) In nucleophilic substitution reactions of octahedral complexes, is lost as……. and a …….intermediate is formed with……..geometry. This is a…….step and the reaction is…….This step is……step.

b) According to Grinberg´s theory, the…….charge on …..induces a …….in ……..that…….each other. Consequently,. ……of the ……shows…….. .

c) The substitution reactions in which a ligand is replaced by ……or by …….. ……..nucleophiles are called…….. occurs in……and……..(……..)

d) Electron-transfer reactions occur by two mechanisms...or …….. and ……or…….. ……

e) In ……..transfer reactions that proceed by…….or ……..-…..mechanism, one complex acts as an……and the other as……..In these reactions, the …… and …….transfer are ……

Q3-I) ***Give the possible mechanism for two only of the following reactions:-*** (12 Marks)

a) Cis $[Pt(PR_3)Cl_2]^0 \rightarrow$ trans$[Pt(PR_3)Cl_2]^0$.

b) $[Co^{2+}(NH_3)_5SO_4]^{2+} + [Cr(H_2O)_6]^{2+} + 3H_3O^+ \rightarrow [Co(H_2O)_6]^{2+} + [Cr(H_2O)_5\,SO_4]^{2+} + 5NH_4^+$

c) $[PtCl_3NH_3]^- \rightarrow [Pt(py)NH_3(Cl)(Br)]^{3+}$.

Please turn over →

Q3II) ***True and false (circulate the correct response and correct the false one):*** (8Marks)

a) T – F Substitution reactions of Pt (II) square planar complexes do not occur with geometry retention.

b) T – F H^-, methyl, phenyl, Cl^-, OH^- and biphenyl are Л bonding ligands.

c) T – F The rates of nucleophilic substitution reactions of square planar in CH_3NO_2 are larger than those in H_2O.

d) T – F Substitution of H atoms on C or N of trans $[Co(en)_2Cl_2]^+$, the strain decreased through S_N1 mechanism.

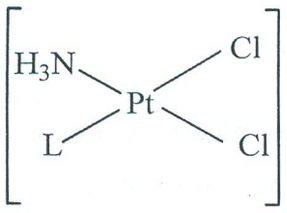
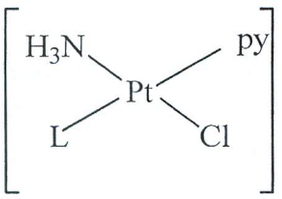
Q4) ***Arrange the following in the order of increasing the property indicated in Brackets indicating the reasons if it is possible*** (20Marks)

a) cis-$[Co(NH_3)_5Cl]$+ &cis-$[Co(tren)(NH_3)Cl]^{2+}$. (Rate of aquation)

b) $[Co(pn)_2Cl_2]^+$& $[Co(i\text{-}bn)_2Cl_2]^+$. (Rate of aquation)

(pn& i-bn are diamines of propylene and isobutylene).

c) $[Pt(dien)N_3]^+$ & $[Pt(dien)CN]^+$. (Rate of substitution)

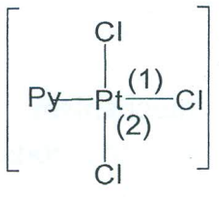
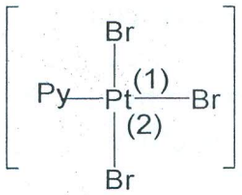
d) trans  + py $\xrightarrow[C_2H_5OH]{25\ ^0C}$ trans  + Cl^-

(L=PR_3, CH^-, H_2O,p-methoxyphenyl)

i) Trans directing ability of L:.....>.....>.....>..... ..

ii) K_1 and K_2 (min^{-1}):..... ..... >.....>.....>.....

iii) E_a(Kcal/mol.):.. ..... >.....>.....> .....

e)  & 

i) Bond length of bond(1):..... >.....

ii) Bond length of bond (2):..... .> .....

With Best Wishes

Dr.O.El-Gammal

Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s) : Inorganic Chem. 424.	كلية العلوم جامعة المنصورة	Second Term Fourth Year Chem. Students) Date : June, 2015 Time Allowed: 2 hours Full Mark : 80 Marks

Answer The Following Questions

1. a) Pu ( ) or (X) on the following : **[10 Marks]**
   i) μ_s not augmented or diminished by an orbital contribution
   ii) The t_2g have an orbital contribution but eg electrons not have
   iii) The χ_M of a sample must be determined in an homogeneous magnetic field
   iv) The cis form of $MA_4 B_2$ Gh has an intense color than of trans form
   v) Mn^{2+} (d^5) salts have the same ground term in both Td and Oh complexes

   b) Explain the curie law and curie weiss law. Indicate the significance of the weiss constant **[5 Marks]**

   c) What is the factors affecting on the breadths of electronic transition band ? **[5 Marks]**

2. a) Identify the lowes energy term $^{2}S^{+1}L_J$ for each : d^3,d^4 and d^7. **[9 Marks]**

   b) Identify the following configuration as T,A or E states in Oh complexes :
   $t_2g\ ^6eg^1$, $t_2g^6\ eg^2$ and $t_2g^2\ eg^0$ **[6 Marks]**

   c) The χ_M of paramagnetic sample decrease as the temp. increased but the diamagnetic affect not change . why ? **[5 Marks]**

3. a) Complete the following : **[9 Marks]**
   i) The energy difference between the energy states of the same multiplicity expressed by ..... whereas of different multiplicity expressed by .....
   ii) The energy difference between the J and (J + 1) energy levels expressed by .....
   iii) Under the Zeeman effect, the energy difference between the J levels expressed by .....

   b) The UV/vis spectrum for $[VCl_6]^{3-}$ shows three d-d bands at 8000, 13000 and 20000 Cm^{-1}. Assignee the bands using the correlation diagram of d^3 ion. **[11 Marks]**

4.a) Comment on the following : **[6 Marks]**
   i) At Cross – over region, the magnetic moment ualve will be anomalous ?
   ii) In the tetragonal, trigonal bipyramid and square pyramidal complexes the magnetic moments should be close to the spin only moment.

   b) There are two types of antiferromagnetism. Discuss these statement ? **[10 Marks]**

   c) d^2 and d^8 ions have not the some J value in Russel – Saunders symbol. How ? **[4 Marks]**

Good Luck, **Prof. G.M. Abu El-Reaash**