Mansoura University
Faculty of Science
Department of Chemistry
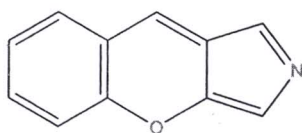
Date 31.12.2012
Time: Two Hours
Full Mark (60)

Exam. of Course 331(Heterocyclic Chemistry)
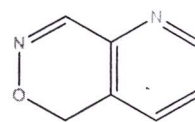**For 3rd Level (Chemistry Students)**

ANSWER THE FOLLOWING QUESTIONS

1- A) Name the following compounds: [10 Marks]
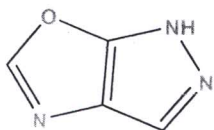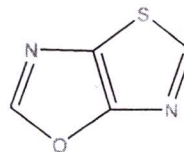
i-

ii-

iii-

iv-

B) i- Aziridines can be prepared from oxiranes. Give example. [10 Marks]

2- A) One of the bioactive furans is Ranitidine (Zantac). Give the method of its synthesis and indicate its uses in medicine. [10 Marks]

B) Explaine the Paal-Knorr for the synthesis of pyrroles, furans and thiophenes. [10 Marks]

3- A) Quinolines and isoquinolines undergoes electrophilic and nucleophilic substitution reactions. Explain and give one example for each one. [10 Marks]

B) Given the fact that: 1,2-azoles can be prepared from 1,3-dicarbonyl compounds and hydrazines. Use this fact to prepare sildenafil (Viagra). [5 Marks]

C) Give examples to explain the N- and C-substitution in pyridines[5 Marks]

Good Luck

Prof.Dr. Mohamed Abbas Metwally

Mansoura University
Faculty of Science
Chemistry Department
Final Examination for Third Year [Chemistry] Students
Organic Synthesis & Organometallic Chemistry [C- 332]

Jan. 2013   Time: 3 hrs.

ANSWER ALL QUESTIONS	[80 Marks]

1) Discuss the synthetic applications of the following reactions: [20 Marks]

   a) Claisen condensation.

   b) Darzens reaction.

2) – (a) Suggest a **synthesis** and give **the name** for each of the following

   compounds: [10 Marks]

   (A)   (B)   (C)   (D)

– (b) Explain by chemical equations each of the following: [10   Marks]

   i) Double Michael reaction.

   ii) Synthesis of (±)-phenylalanine.

3-a)-Discuss the mechanism that account the addition of Grignard reagent to tetraphenylpropenone.

b)- Discuss the chemical structure of ferrocene and its chemical reactions with varies diazonium compounds & its nitration, halogenations, sulfonation.

4-a)- Complete the equations and write mechanisms that account for the products formed in each of the reactions :-

1) Me_2Si ⬜ $\xrightarrow{\text{Heat}}$

2) $\underset{Si}{\overset{Me\diagdown\diagup Me}{}}$ $\xrightarrow{\text{Pyrolysis}}$
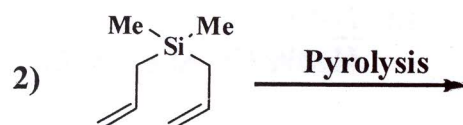
b)-Outline and show by equations the following:-
   a) The reaction of cyclohexanone with $CH_3.CH_2.CH_2.MgI$.
   b) Pyrolysis of $(Me_3Si)_3Si.CO.Bu.^t$
   c) The reaction of *o*-bromoanisole with *n*-butyl lithium

Prof. Dr. E. M. Afsah -- Prof. Dr. S. S. Elmorsy

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Mansoura University
Faculty of Science
Chemistry Department
Subject: Inorganic Chemistry
Course(s): Chemistry (321)

First Term
3rd Year Students (Chem.)
Date: 10/1/2013
Time Allowed: 2 hours
Full Mark: 60 Marks

Answer the following questions

Section A:-

Answer the following questions:-

1- (A)- Put (√) or (x) and correct the statements (15 Marks):-

i- Cr is active at room Temperature.
ii- $Fe_2(CO3)_3$ is very stable compound.
iii- $La(OH)_3$ is more basic than $Sc(OH)_3$.
iv- Co(III) complexes are very stable.
v- CrO_4^{2-} ion has an octahedral structure.
vi- Cr(III) are more stable than Co(III) compounds.
vii- Potassium nitroprosside is used for detection of nitrogen.
viii- FeO is a stoichiometric compound.
ix- The formula of the compound of the brown ring test is $[Fe(H_2O)_5NO]^+$.
x- CO is very poisnous compound.
xi- $FeCl_3$ exists as a dimer in the gasous state.
xii- V reacts with Cl_2 forming VCl_3.
xiii- CrO_3 can be used as oxidizing agent.
xiv- Sc has a great tendency to form complexes than La.
xv- Mn(III) compounds are very stable than Mn(II).

1- (B) Complete and balance the following equations (15 Marks):-

i- $YCl_3.7H_2O$ (by heating) $\rightarrow$
ii- $TiCl_4 + H_2O$ $\rightarrow$
iii- $V + Br_2$ (heat) $\rightarrow$
iv- $Cr + HCl$ (g) $+ H_2O$ $\rightarrow$
v- $MnO_2 + $ Conc. H_2SO_4 $\rightarrow$
vi- MnF_3 (heat) $\rightarrow$
vii- $Co + Br_2$ (heat) $\rightarrow$
viii- $Pt +$ Aqua regia $\rightarrow$
ix- $Mn^{3+} + 2H_2O +$ in presence of $H_2SO_4 \rightarrow$ $\rightarrow$
x- $CrO_4^{2-} + H^+$ $\rightarrow$
xi- $Mn_3O_4 + Al$ $\rightarrow$
xii- $KMnO_4 +$ sodium sulphite $\rightarrow$
xiii- $Co + F_2$ (Heat) $\rightarrow$
xiv- $FeCl_3 + Na_2CO_3$ $\rightarrow$

xv- Ni^{2+} + DMG (alkaline medium)   →

2- Comments on the following (10 Marks):-

    i-   Density of transition metals are higher than s and p-block elements.

    ii- K is more active than Cu inspite of the two metals have $4S^1$ configuration.

    iii- Mn^{2+} complexeswith waek ligands have pale colors.

    iv- It is easy to differenciate between ferro- and antiferromagnetic compounds at low temperature.

    v- $TiCl_4$ is a colourless and fuming liquid.

3- Write short notes on the following:-

    i- Colors of Transition metals (2.5 Marks).

    ii- Extraction of Cr from its ore (2 Marks).

    iii- Differentiation between square-planar and octahedral Ni^{2+} complexes (2.5 Marks).

    Iv-   Importance of Mn and its salts (2 Marks).

    vi- Mechanism of Ziggler-Nata catalyst (2.5 Marks).

    vii- Preparation of chromium basic acetate (2 Marks).

    viii-   Preparations of chromium oxides (1.5 Marks).

    ix- Lanthanide contraction (2 Marks).

    x- Non-stoichiometric compounds (1 Marks).

    xi- Importance of $K_4[Fe(CN)_6]$ in Analytical chemistry (2 Marks).

Good Luck and Best Wishes

P rof. Mohsen Mostafa

Mansoura University
Faculty of Science
Chemistry Department
Subject: Organic Chemistry

Examination for
3rd Level Chemistry Students.
Date : January 2013
Time Allowed : Two hours

Answer **Three Only** of the Following Questions:

1. Discuss the following topics:-
  1.a. The carbide theory of petroleum origin.   [7 Marks]
  1.b. The polymerisation process used in petroleum refineries for the
       production of the highest grade motor fuel (iso-octane [8 Marks]
  1.c. Distillation products of crude petroleum.   [5 Marks]

2. Give short notes on :
  2.a. Sulphur compounds found in petroleum and its
       distillates.   [6 Marks]
  2.b. The main differences between thermal and catalytic
       Cracking.   [6 Marks]
  2.c. Diesel index of diesel fuels.   [4 Marks]
  2.d. Classification of crude petroleum.   [4 Marks]

3. Discuss each of the following :
  3.a. Specifications of the solvents used for extraction of aromatic
       Hydrocarbons from petroleum distillates.   [6 Marks]
  3.b. Hydrogen refining of petroleum distillates.   [6 Marks]
  3.c. Sweetening process of petroleum distillates.   [8 Marks]

4. Write a short note on each of the following:-
  4.a. Structure and classification of synthetic detergents. Give an example
       for each class.   [10 Marks]
  4.b. Aniline point of petroleum distillates.   [6 Marks]
  4.c. API gravity of petroleum.   [4 Marks]

With best wishes

Prof. Dr. O. Habib

Mansoura University Faculty of Science Department of Chemistry, Time allowed: 2Hours		Third year, Chemistry students. Final exam for 311Chem Gravimetric Analysis Jan.,2013

Answer the following questions:

1. Define the following   (20marks)

1. Major, minor and trace constituents   2. Co-agulation and peptization

3. Occulusion and inclusion   4. Relative super-saturation

5. Digestion   6. DTA and DTG

7. Gravimetric factor   8. Post precipitation

9. Solubility product   10. Homogenous precipitation

2. a Write shortly on the following: (12marks)

a) Effect of relative super-saturation on the particle size of precipitate

b) Formation of colloidal precipitate and how could you overcome it

c) Different types of co-precipitation (causes and treatment)

d) Optimum conditions for a successful precipitation method

2.b. 500mg of binary mixture containing $CaC_2O_4.H_2O + MgC_2O_4.2H_2O$ was heated up to $900^{\circ}C$. The weight of the mixture at $500^{\circ}C$ was 240mg and at $900^{\circ}C$ was 152mg. calculate the % composition of the binary mixture. (Ca =40, Mg = 24, C = 12, O = 16, H = 1)   **(8 marks)**

3.a Discuss briefly four examples for each of the following: (12marks)

i) Indirect volatilization methods in gravimetric analysis

ii) Organic reagents used in gravimetric analysis

iii) Experimental factors in a thermal analysis method

3.b A 0.864g of copper ore was analyzed by precipitation of Cu as $Cu_2(SCN)_2$. The weight of precipitate was 0.397g. Calculate the % Cu in the ore. (Cu =63.5, S = 32.0, C =12.0, N=14.0) **(4marks)**

3.c Calculate the pH at which Fe^{3+} can precipitated completely as $Fe(OH)_3$ and also Mg^{2+} as $Mg(OH)_2$ knowing that $K_{sp\ Fe(OH)3} =3.8x10^{-38}$, $K_{sp\ Mg(OH)2}=5x10^{-12}$. Comment on your results   (**4mark**

4.a <u>**Give an account on:**</u>   (**12marks**)

a) Effect of complex ion formation on the solubility of precipitate

b) Effect of pH on the precipitation of sparingly soluble salts of weak acids

c) Effect of presence of strong electrolyte on the solubility of precipitate

d) Effect of washing agent on the precipitate properties

4.b) Ksp for CaC_2O_4 is $2.3x10^{-9}$ .How much water is required for dissolution of 0.5g of this salt .

  (Ca =40, C = 12, O = 16)   (**4marks**)

4.c) Calculate the solubility of FeS in distilled water and in 0.1M KCl and 0.1M $CaCl_2$.

Ksp FeS =$3.7x10^{-19}$**.** Comment on your results   (**4marks**)

Best wishes

Prof. Dr. Magdi E. Khalifa

Answer the following questions:

1) a- Illustrate the relation between electrode potential and concentration   *(10 marks)*

b- Given the cell: Ag/AgBr/KBr/Hg$_2$Br$_2$/Hg   *(10 marks)*

i-Complete: The type of the cell is ---------   because ----------

ii- Deduce in details the cell emf.

c) Write on: *(10 marks)*

i- Liquid junction potential   ii- Gas electrodes

2) a- Taking the following standard electrode potentials: *(10 marks)*

E° $_{Zn+2/Zn}$ = -0.76 V,   E° $_{Cu+2/Cu}$ = 0.337 V,   E° $_{Ag+/Ag}$ = 0.80 V

E° $_{Cd+2/Cd}$ = -0.403 V,   E° $_{Cl2/ Cl-}$ = 1.36 V,   Construct cells of the following

electrode pairs: i- Zn^{+2}/Zn and Cu^{+2}/Cu   ii- Cd^{+2}/Cd and Cl$^-$/ Cl$_2$

iii- Cu^{+2}/Cu and Ag$^+$ / Ag.   In each cell write the electrode reaction, cell

reaction and calculate E°, ΔG° and equilibrium constant (K).

b- Give the reason: *(10 marks)*

i- Saturated KCl solution is preferred in salt bridge

ii- The decomposition potential of acids except halogen acids is 1.7 V

iii- Selecting Pt as the best choice for the standard H$_2$ electrode

3) Complete: *(10 marks)*

a- Maxwell-Boltzman distribution law given by the relation ------------

b- The overpotential necessary for electrolysis of water is   ------------

c- In Cadmium-Weston cell ------------ is the positive electrode but --------------- is the

negative electrode

d- The exchange current (i∘) is ---------

e) When the electrode is polarized the overpotential plays two roles: (i) -------

(ii)---------------

Good Luck   **Examiners: Prof.Dr.A.S.Fouda and Prof.Dr.A.Helmy**