Mansoura University
Faculty of Science
Geology Department
Date: 3 / 1 / 2016
Time: Two Hours

First term Exam 2015L2016
Subject: Optical Mineralogy and Rock Forming Minerals (ج.ج)
Second Program Geology
Total Marks: 60 Marks

First Part- OPTICAL MINERALOGY

Answer the following questions: **(10 Marks for each)**

1- Draw the followings :--
   a- Behaviour of light in Nicol prism. b- Interpretation of Becke line.
   c- Critical Angle & Total Reflection

2- Write in detail on the followings :-
   a- Pleochroism. b- Twinkling c- Extinction

3- Describe in detail the followings :-
   a- Double Refraction b- Interference Colours c- Relief

Second Part- ROCK-FORMING MINERALS

Answer the Following Questions; **(15 Marks for each)**

1- Complete the following; **(5 Marks for each)**

i- The General Chemical Formula of Silicate Minerals ……,, and give symbols explanation X=……, Y=……, Z=…… and w=…… .

ii- Silicate minerals classification with example of related minerals is ……

iii- General chemical formula of amphibole minerals is …… and the paragenesis of hornblende is ……

iv- The varieties of alkali feldspars and its paragenesis are……., also the varieties of plagioclase feldspars and its paragenesis are…… .

2- **Answer with X or √ and give the appropriate correction.** **(2 Marks for each)**

i- Mica minerals are like biotite, muscovite, chlorite and serpentinite and used as gemstone.

ii- Olivine minerals like forsterite and diopside occur in dunite and basalt.

iii- Pyroxene minerals are 1- ortho-pyroxene like enstatite, aegirine and clino-pyroxene like augite and diopside.

iv- Ionic radius and charge control the ionic substitution.

v- SiO_2 polymorphic group are like quartz varieties, plagioclase and K-feldspars.

لجنة التصحيح: ** أ.د./ أحمد عبد اللطيف **د./ شعبان مشعل

Mansoura University
Faculty of Science
Chemistry Department
Course: CHEM 235

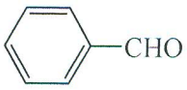
First Term Exam
Level Two: CHEM 235
Time Allowed: 2 Hours
Full Mark: 60 Marks
Date: 10 January, 2016

Answer the following questions:

Question (1): (15 Marks)

(A) Complete the following reactions by the major product(s):

(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3 + 3\,I_2 \xrightarrow{\text{aq. NaOH}}$ ---------- + ----------

(b) 2  + aq. NaOH ⟶ ---------- + ----------

(c) $CH_3-\overset{\overset{CH_3}{|}}{CH}-CH_2-CH_3 + Cl_2 \xrightarrow{\text{Light}}$ ----------

(d) $CH_3-CH_2-CHO + H_2NNH-\overset{\overset{O}{\|}}{C}-NH_2 \longrightarrow$ ----------

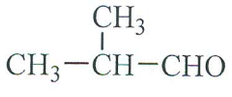
(e) $CH_3-\overset{\overset{CH_3}{|}}{C}=CH_2 \xrightarrow{HBr\,/\,H_2O_2}$ ----------

(d) $CH_3-C\equiv CH \xrightarrow{NaNH_2}$ ---------- $\xrightarrow{CH_3CH_2I}$ ----------

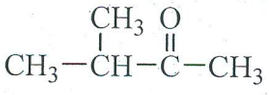
(B)An alkene with the formula C_8H_{16} reacts with ozone (O_3/Zn-H_2O) to provide acetone and pentanal. What is the structure of this alkene?

Question (2):

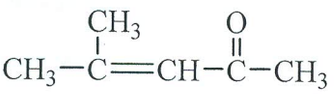
For compounds from (1) to (4), answer the questions (a) to (g): (15 Marks)



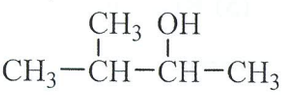
Compound (1)



Compound (2)



Compound (3)



Compound (4)

(a) Give the IUPAC names for compounds (1), (2) and (3)?
(b) How can you convert compound (1) into compound (2)?
(c) Give the product when compound (1) is oxidized by potassium dichromate ($K_2Cr_2O_7$).
(d) Suggest a suitable method to prepare compound (3).
(e) How can convert compound (2) into compound (4).
(f) Action of phosphorus trichloride (PCl_3) on compound (4).
(g) Reduction of compound (1) with Zn-Hg in the presence of HCl.

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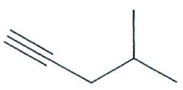
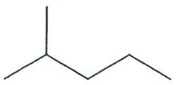
Question (3): (15 Marks)

(A) Choose the correct answer:

(1) Which from the following chemical structures has the IUPAC name: 4-Methyl-2-pentyne

(a)  (b)  (c)  (d) 

(2) The IUPAC name of the alcohol $CH_3CH(CH_3)CH_2CH(OH)CH_2CH_3$ is:
(a) 2-Methyl-4-hexanol (b) 2-Methyl-4-hexanone
(c) 5-Methyl-3-hexanol (d) 5-Methyl-3-hexanone

(3) Hydration of CH_3-C≡CH with water and $H_2SO_4/HgSO_4$ produces:
(a) CH_3CH_2CHO (b) CH_3COCH_3 (c) $CH_3CH_2CH_3$ (d) $CH_3CH=CH_2$

(4) Addition of two moles of HCl to 1-butyne produces?
(a) 1,1-dichlorobutane (b) 1,2-dichlorobutane
(c) 2,2-dichlorobutane (d) 2,3-dichlorobutane

(5) Compounds of the type R-CH_2-OH are refereed to as ..... alcohols.
(a) quaternary (b) tertiary (c) secondary (d) primary

(6) The major product that produced from the action of alc. KOH on $CH_3CH(Cl)CH_2CH_3$ is:
(a) $CH_2=CHCH_2CH_3$ (b) $CH_3CH=CHCH_3$ (c) $CH_3CH(OH)CH_2CH_3$

(B) Suggest a suitable method to differentiate between 2-butanol and 3-pentanol.

Qustion (4): By equations only, Expalin the following reactions? (15 Marks)

(1) Reaction of benzaldehyde with acetic anhydride in presence of CH_3COONa.
(2) Conversion of 2-butene into 2-butyne
(3) Heating of 2-methyl-2-butene with basic $KMNO_4$ solution.
(4) Kolbe electrolysis $KOOCCH_2CH_2COOK$.
(5) Reaction of acetaldehyde with two moles of methanol to form Acetal.

GOOD LUCK

Prof. Dr. Ahmed Fadda, Prof. Dr. Margret Mansour, Prof. Dr. Ehab Abdel-latif
Dr. Manal El-fidawy, Dr. Ghada Emad and Dr. Ibrahim Youssef

Mansoura University Faculty of Science Chemistry Department Course: Represented Elements Code: Chem 221		First Semester 2nd Level Chemistry Date: 13 Jan. 2016 Time: 2 hours Marks: 80

Answer The Following Questions

I) Comment on (7 only) of the following:- **(28 marks)**

1) Thallous (I); $_{81}Tl^{+}$ compounds are stable.
2) The 1st Ionization Energy (1st IE) of ($_4$Be, $_7$N and $_{10}$Ne) is high while for ($_8$O) is low.
3) The reaction of elements of Group IA with water is increasing down the group.
4) Berylium metal is amphoteric whereas aqueous solution of Be(II) is acidic.
5) Carbon monoxide is considered as good reducing agent.
6) Magnesium(II) chloride is heavily hydrated more than Barium(II) chloride.
7) Nitrogen (N_2)molecule is generally unreactive while Phosphorous molecule (P_4) is highly reactive.
8) The solubility of most of the salts of alkali group (IA) elements is decreasing down the group.
9) The acidity and pka values in the hydrolysis of one molecule and three molecules of boric acid (H_3BO_3)
10) Effect of increasing CO_2 or O_2 concentration on the blood pH.

.....

II) . A- Write shortly on (4 only) of the following:- **(20 marks)**

1) Biological importance of carbon dioxide.
2) Separation of pure silicon element (Si) from silica ore (SiO_2).
3) Photodissociation of nitrogen dioxide (NO_2) and Ozone (O_3) levels in sunny days.
4) Isolation of pure aluminium (Al) from bauxite ore {AlO(OH)}.
5) Production of nitric acid (HNO_3) by Ostwald process.
6) Bond strength of the pairs of (C-C & Si-Si) and (C-O & Si-O) bonds

.....

II) B-Complete (4 only) of the following chemical equations:- **(8 marks)**

1) $Ba + O_2$ (at 500 ^{o}C) $\rightarrow$, 2) $H_3BO_3 + H_2O \rightarrow$

3) $Be_2C + H_2O \rightarrow$, 4) $_7N^{14} + {}_0n^1 \rightarrow$

5) $Li_3N + D_2O \rightarrow$, 6) $B_2O_3 + NH_4BF_4 \rightarrow$

.....

III. A) 1-Discuss the structure and nature of bonding for

a) Diborane (B_2H_6) , b) Trimethylamine $\{N(CH_3)_3\}$. ($_5B$, $_6C$, $_7N$) **(7 marks)**

2- Explain how an insulator like Silicon (Si) can be converted to semiconductors (n-type & p-type) , draw the three Figures. **(5 marks)**

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III. B) Choose the most correct answer for 8 only:- **(12 marks)**

1) $Li + O_2 \rightarrow$ ....., while $Rb + O_2 \rightarrow$ .....
a) Li & RbO b) LiO_2 & RbO_2 c) Li_2O & RbO_2 d) LiOH & RbO_2

2) $CaC_2 + N_2 \rightarrow$ .....
a) Ca_3N_2 b) $CaCN_2 + C$ c) $CaCN_2$ d) C

.....

3) The structure of $N(SiH_3)_3$ has .....
a) triagonal b) triagonal pyramidal c) due to sp^2 d) a & c are correct

4) Diamond is ..... than graphite due to .....
a) harder, saturation b) sp^2 c) weaker, sp^3 d) harder, sp^2

5) Pb^{2+} is stable than Pb^{4+} due to
a) metallic character b) inert pair effect c) inertia of $6s^2$ electrons d) b & c

6) Baking powder (.....) is responsible for evolution of CO_2 during baking
a) $NaHCO_3$ b) Na_2CO_3 c) $Ca(H_2PO_4)_2$ d) $CaHPO_4$

7) $H_2SO_4 + SO_3 \rightarrow$ .....
a) fuming sulphuric acid b) $H_2S_2O_7$ (oluem) c) H_2SO_3 d) a & b

8) Oxidation state of Cl in $HClO_4$ is
a) +1 b) +7 c) +5 d) +4

9) ^7_3Li isotope is used in treatment of cancer *via*.....
a) neutron capture therapy b) physiotherapy
c) chemotherapy d)electron capture therapy

10) Chlorophyll is ..... porphyrin complex, catalyse the ..... process
a) Ca^{2+}, gypsum b) Mg, photosynthesis
c) Fe^{2+}, O_2 storage d)Mg^{2+}, photosynthesis

11) .....is used as anti-acid for ulcer patients
a) $CaSO_4$ b) $MgCO_3$ c) $BaSO_4$ d) $NaHCO_3$

Best wishes

Prof. Tawfik Rakha, Prof. Sahar Mostafa, Dr. Rania Ramadan

Mansoura University
Faculty of Science
Department of Geology

2nd Level, Geology & Geophysics
Final exam, Petrology (G 203)
Time allowed: **TWO Hours**
Academic Year: 2015-2016
Date: 20/1/2016

Please answer ALL questions

1- Complete the missing parts in the following sentences (15 marks)

1- Phyllite is low-grade metamorphism of ....., ..., ..., or .....

2- Volatiles of magma include ....., ..., ...

3- Conglomerate is a ..... that contains ..... clasts. The space between the clasts is generally filled with ..... and/or a chemical cement that binds the rock together.

4- Light bands of gneiss include ....., ..., ..., whereas dark bands contain ..... and .....

5- Rhyolite is equivalent to .....; its texture is ..... and may contain ..... of orthoclase, mica and quartz.

6- Pumice is highly ..... and is of ..... composition.

7- Lopoliths are ..... or ..... concordant bodies with top ..... and ..... bottom.

8- Matrix of sandstone is composed of ..... whereas matrix of conglomerate includes.....

9- Foliation of metamorphic rocks forms by ..... and .....

10- Allochems of limestone include ....., ..., ..., ...

2- Tick (√) or (X) and correct the false sentences (15 marks)

1- Granitic magmas considered as secondary and highly evolved magma. ( )

2- Thermal expansion is a significant form of mechanical weathering. ( )

3- Matrix was deposited at the same time as the framework grains or infiltrated shortly after. ( )

4- Sedimentary structures are formed after deposition of sediments. ( )

5- Plate tectonic plays a minor role in the generation of most magma. ( )

6- Laccolith is a discordant body with convex bottom and flat upward. ( )

7- Hydrolysis is the reaction of any substance with water. ( )

8- The migration of ripples, dunes and sand-waves gives cross-stratification. ( )

9- Non-marine carbonates include chalk, limestone and oolitic limestone. ( )

10- Non-foliated metamorphic rocks are composed of equidimensional grains. ( )

(Flip the paper)

Mansoura University
Faculty of Science
Department of Geology

2nd Level, Geology & Geophysics
Final exam, Petrology (G 203)
Time allowed: **TWO Hours**
Academic Year: 2015-2016
Date: 20/1/2016

3- Compare between each of the following (use drawing if it is possible) (15 marks)

1- Porosity and permeability.

2- Sandstone and limestone.

3- Phacoliths and lopoliths.

4- Granite and diorite.

5- Gneiss and phyllite.

4- Do as shown **(15 marks)**

1- Migmatites. **(Write short notes)**

2- Tuff and volcanic breccia. **(Give a short description)**

3- Frost wedging. **(Describe and illustrate with drawing)**

4- Sedimentary rocks. **(What can tell us?)**

5- Heat can metamorphose rocks. **(Determine sources of heat)**

With my best wishes
Dr. Tarek Anan

لجنة التصحيح: أ.د. أمين مصطفى غيث د. طارق إبراهيم عنان*

Mansoura University Faculty of Science Physics Department		For Geology Students Second Level Date : January 2016
Course: Phys. (222) Subject: Atomic Physics		Full Mark:: 60 Marks

Answer **four** Questions **only**

Each Question (15) Marks **Time allowed : 2 hours**

[1]A- Why is a prism able to analyze the spectrum into its components? **[5] Marks**

B- Explain the phenomena of self absorption . **[6] Marks**

C- An electromagnetic radiation of wavelength 2420A° is just sufficient to ionize the Sodium atom. Calculate the ionization potential of this atom **[4] Marks**

[2]A- Explain the basic difference between the emission of each of these two types of electromagnetic radiations;

a-) An x-ray photon . b-) An U.V. photon. **[4] Marks**

B- A radiation is incident on a surface of a metal for which the work function is 3.6eV. Calculate the maximum wavelength that it must have to cause emission of electrons **[6] Marks**

C- What we mean by a persistent line?. What is its importance in spectral analysis methods? **[5] Marks**

[3]A- Identify through a sketch the transitions responsible for the emission of each of the following lines in the x-ray spectrum of any element ;

K_γ , L_β , K_α & M_α. **[4] Marks**

B- Define the resolving power of a spectroscopic instrument and show its importance in spectroscopic analysis techniques **[4] Marks**

C If an x-ray diffractometer can be used over a 2θ range from 20° to 160° and the measurements are restricted to the first-order reflections. What is the range of wavelengths that can be used to measure the reflection pattern of a certain crystal that have a cubic lattice spacing of 2.4A° ?. **[7] Marks**

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[4]A- Explain the role of the optical electron(s) in the production of the spectrum of an element. **[4] Marks**

B- The potential difference between the target & cathode of an x-ray tube is 50kv.

i-) Calculate the accelerating energy of electrons causing such emitted radiation.

ii-) What is the maximum frequency of the emitted radiation ? **[3] Marks for each**

C- Compare between the linear and non-linear dispersion showing its importance in spectral analysis techniques. **[5] Marks**

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[5]A- Write a short note on the photoelectric effect **[5] Marks**

B- Explain why the spectrum of any atom can be used to identify it. **[4] Marks**

C- Calculate the energy, frequency, and wavelength of a photon emitted during the transition from the **n = 5 state** to **n = 1 state** in the Hydrogen atom using the data given in the following table ; **[6] Marks**

n	1	2	3	4	5
E (eV)	-13.6	-3.39	-1.51	-0.85	-0.54

Some useful physical constants and quantities; $c=2.998\times10^{8}\ m.s^{-1}$, $e=1.6\times10^{-19}\ C$, $h=6.626\times10^{-34}$ j.s, also $h=4.136\times10^{-15}$ eV.s, $1eV=1.602\times10^{-19}$ j & $1j=6.24\times10^{18}$ eV