

Section B

Answer the following questions:

(25 Marks)

1- Answer Only Two from the following:

(9 Marks)

- a) 0.035 moles of SO_2 , 0.5 moles of SO_2Cl_2 , and 0.08 moles of Cl_2 are combined in an evacuated 5.0 L flask and heated to 100°C . What is Q before the reaction begins? Which direction will the reaction proceed in order to establish equilibrium? $\text{SO}_2\text{Cl}_2(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \text{Cl}_2(\text{g})$ ($K_c = 0.078$ at 100°C)

b) Define each of the following terms:

Buffer solution with example–Buffer capacity–Brönsted-Lowry acid

- c) The boiling point of chloroform was raised by 0.323°C when 1.029 g of a substance was dissolved in 70 g of it. Calculate the molecular weight of the substance. (K_b for chloroform is $3.9^\circ\text{C}/\text{mol}$.)

2-Answer Only Two from the following:

(8 Marks)

- a) At 18°C , the solubility of CaC_2O_4 in water is 0.00067g/100 ml. Calculate its solubility product ($\text{Ca}=40$, $\text{C}=12$, $\text{O}=16$).

b) Define each of the following terms:

Molal depression constant–The molality–Dibasic acids with example

- c) Calculate the pH of : i) 0.5M CH_3COOH . (K_a of $\text{CH}_3\text{COOH} = 1.75 \times 10^{-5}$)
ii) 0.25M CH_3COONa solution. ($K_w = 1 \times 10^{-14}$)

3-Answer Only Two from the following:

(8 Marks)

- a) What is the solubility of $\text{Mg}(\text{OH})_2$ in 1M NH_3 solution? ($K_b = 1.8 \times 10^{-5}$, $K_{sp} = 1.8 \times 10^{-11}$)
b) What will happen when a small amount of HCl is added to a buffer solution of ($\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$)?
c) The following system is at equilibrium. In which direction (right or left) will the position shift with the following changes:



- i) Addition of more nitrogen. ii) Removal of hydrogen.
iii) Removal of ammonia.

Good Luck

Examiner: Dr. Rasha Mohamed Kamal

Assiut University
Faculty of Science
Chemistry Department



January, 2018

Time: 2 hr.

Final Examination For 1st year Students (General Chemistry II, 105C).

Section A (Organic Chemistry)

1- Choose the correct answer (answer 5 only) (5 Marks)

- a) What could be the name of a compound that has the general formula ROR?
i) Acid, ii) Ester, Ketone, iii) Alcohol
- b) Which formula represents a saturated hydrocarbon?
i) C_3H_5 , ii) C_3H_4 , iii) C_3H_6 , iv) C_3H_8
- c) Which compound is an isomer of ethanol?
i) Ethene, ii) Methyl formate, iii) Methyl acetate, iv) dimethyl ether.
- d) In a molecule of C_3H_6 , the total number of covalent bonds is:
i) 6, ii) 7, iii) 8, iv) none.
- e) Which compound is an ester? i) CH_3OH , ii) CH_3OCH_3 , iii) CH_3COOCH_3
- f) A molecule of propene is similar to a molecule of propane in that they both have the same: i) Structural formula, ii) Molecular formula, iii) Number of carbon atoms.

2- Methane reacts with chlorine to produce methylchloride.

Outline the mechanism of the reaction

(5 Marks)

3- Complete the following equations:

i) 2-Butene + HBr \rightarrow

ii) 1,2-dimethylcyclopentene + H_2 (Pd/C catalyst) \rightarrow

(4 Marks)

4- a) Ozonolysis of an alkene produces formaldehyde. Deduce the alkene structure.

(4 Marks)

b) In which compound is carbon more oxidized: sodium carbonate or sodium acetate

(3 Marks)

c) Explain by using a mechanism the free radical polymerization of ethylene to give polyethylene

(4 Marks)

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Examiner: Prof. Ali Ahmed Abdel-Hafez

First Semester Examination
Subject: General Chemistry (C-100)
Students: First Level "Credit Hours System"

Section (A): (25 Marks)

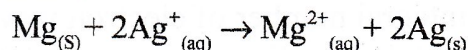
Answer all the following questions:

Question One: Answer **only three** from the following: (15 Marks)

- State Charles' law and derive it from the kinetic gas equation.
- "The magnitude of adsorption of gases on a solid surface depends on several factors." Explain these factors briefly.
- i) What is meant by **only three** from the following:
Isotropy, Brownian movement of colloids, critical state, standard emf of a cell.
ii) How would you prepare each of the following colloidal sols: gold, sulphur.
- d) Give a reason for **only four** from the following:
i) At high pressure, the compressibility factor of a gas (Z) is greater than one and Z/P curve lies above the ideal behaviour.
ii) Zinc can precipitate copper from its solution.
iii) Vapour pressure of a liquid increases with increasing its temperature.
iv) Solids are rigid and have a definite volume and shape.
v) The charge on colloidal particles.

Question Two: Answer **only two** from the following: (10 Marks)

- a) Assuming the following cell reaction:



Given the standard reduction potentials: $E^\circ_{\text{Ag}/\text{Ag}^+} = +0.80 \text{ V}$ and $E^\circ_{\text{Mg}/\text{Mg}^{2+}} = -2.37 \text{ V}$

- Write anode and cathode reactions.
 - Write cell representation.
 - Predict whether the reaction is feasible or not.
 - Calculate the value of cell potential (emf) at 25°C when $[\text{Mg}^{2+}] = 0.001 \text{ M}$ and $[\text{Ag}^+] = 0.1 \text{ M}$
- b) Calculate the pressure exerted by 34.0 g of ammonia (molecular mass=17) in a 5 litre flask at 27°C using both ideal gas and van der Waals equations.
($R = 0.0821 \text{ atm.L.K}^{-1}.\text{mol}^{-1}$, $a = 4.17 \text{ atm.L}^2.\text{mol}^{-2}$, $b = 0.0371 \text{ L.mol}^{-1}$)
- c) i) Write the cell reaction and emf equation for the following cell:
 $\text{Al} | \text{Al}^{3+} || \text{H}_2\text{SO}_4 | \text{H}_2 (1 \text{ atm, gas}), \text{Pt}$
ii) Calculate the kinetic energy of an ideal gas per molecule (e) and per mole (E) at 27°C .
($N_A = 6.02 \times 10^{23}$, $R = 8.314 \text{ J.K}^{-1}.\text{mol}^{-1}$)

Prof. Maher M. A. Hamed, Prof. Zahra A. Ahmed, Dr. Mohamed N. Abd El-Hameed, and Dr. Ahmed A. K. Mohammed

Please turn over for section (B) —————>

Section (B): (25 Marks)

Answer the following questions:

First question: Answer each of the following: (15 Marks)

- (a) Write down Lewis structures for each of the following: CO_3^{2-} and ClF_3 , assign the formal charge for each atom in both of them. (5 Marks)
- (b) Using the molecular orbital theory, draw the energy level diagrams for O_2^{2-} and B_2 ; calculate the bond order and predict the magnetic properties for each of them. (5 Marks)
- (c) Based on VSEPR theory, predict the electron domain geometries and the molecular shapes for PCl_3 and BrF_5 . (5 Marks)

Second question: Answer Only Two from the following: (10 Marks)

- (a) Choose the correct answer: (5 Marks)
- i- Which of the following is the correct set of quantum numbers for the outermost electron of aluminium atom?
- (a) $n = 3, \ell = 1, m_\ell = +2, m_s = -1/2$ (b) $n = 3, \ell = 1, m_\ell = -1, m_s = +1/2$
(c) $n = 3, \ell = 1, m_\ell = -2, m_s = +1/2$ (d) $n = 3, \ell = 2, m_\ell = +1, m_s = -1/2$
- ii- The geometrical shape of SF_4 molecule is:
- (a) tetrahedral (b) trigonal bipyramidal (c) square planar (d) seesaw
- iii- The hybrid orbitals for S in SH_6 is:
- (a) sp^3d^2 (b) sp^3d (c) sp^3 (d) sp^2
- iv- The bond order in He_2^+ species is:
- (a) 0.0 (b) 0.5 (c) 1.0 (d) 1.5
- v- assumed that, the electron orbit would be allowed only if its circumference ($2\pi r$) is equal to an integral number of electron wavelength ($n\lambda$).
- (a) Pauli (b) de Broglie (c) Zeeman (d) Heisenberg
- (b) Put true (✓) or false (X) for each of the following: (5 Marks)
- i- For the third spectral emission line in Paschen series of H-atom: $n_1=3$ and $n_2=5$
- ii- The shape of HCN molecule is bent.
- iii- Subsidiary quantum number (ℓ) represents the orientation of orbitals in the space
- iv- The bond energy of H_2^+ is less than that of H_2 molecule.
- v- In a bonding molecular orbital, the nuclei are attracted to an accumulation of electron density outside the internuclear region.
- (c) Give reasons for each of the following: (5 Marks)
- i- The bond angles in H_2O molecule is smaller than that in NH_3 .
- ii- Beryllium molecule (Be_2) does not exist.
- iii- Bond length in C_2 is much longer than that in O_2 (bond order=2 in both molecules).

(Atomic numbers: H=1, He=2, Be=4, B=5, C=6, N=7, O=8, F=9, Al=13, P=15,

S= 16, Cl= 17, Br= 35)

Good Luck

Assiut University

Faculty of Science

Chemistry Department



Date: 5 Jan. 2018

Time : 2 hours

First Semester Final Examination

Subject: Quality Assurance (UR 020)

Students: Credit Hours System (Applied Industrial Chemistry group)

Answer the following questions:

1. International standard ISO/IEC 17025 has much management requirements for the competence of testing and calibration laboratories, write with brief about (only 10): (20 Marks)

- Document control
- Review of requests, tenders and contracts
- Subcontracting of tests and calibrations
- Purchasing services and supplies
- Service to the customer
- Complaints
- Control of nonconforming testing and/or calibration work
- Improvement
- Corrective action
- Control of records
- Management reviews
- Internal audits

2- Define the following terms:

(10 Marks)

Quality – Accreditation – Assessment – Quality Control (QC) –
Quality Assurance (QA).

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٣- Decide the true (√) or false (x) sentence and correct the false

in the following (only ٥) :

(١ • Marks)

- a. Quality is labeled as a value for money approach ().
- b. Quality as consumer dissatisfaction ().
- c. Quality is changes in Technology, Economic and Environmental ().
- d. Quality is Issues have forced organizations to re-orient themselves towards ever changing business scenario ().
- e. Many organizations have achieved higher level of performance by adopting old ideas, concepts ().
- f. Quality is increasing expectations from customer continuously ().

٤- Complete the table from the following sentence:

(١ • Marks)

Productive and innovative efficiency - Constraints on competition –

- Reduction of imperfect information - Increased competition

- Constraints on innovation - Cost reductions

Positive Economic Effects of Standards	Negative Economic Effects of Standards
-	-
-	-
-	-
-	-
-	-
-	-

With My Best Wishes

Dr. Mohamed Mahmoud

First Semester Examination
Subject: General Chemistry (C-100)

Industrial Chemistry Program Students: First level "Credit Hours System"

Section (A): (25 Marks)

Answer all the following questions:

First question: Answer **Only Three** from the following: (12 Marks)

- Calculate the wavelength in nanometer of the third line in the emission spectrum of Balmer series of the hydrogen atom ($R_H = 109678 \text{ cm}^{-1}$).
- Give reason for each of the following:
 - While the O-N-O bond angle in NO_2 is 134.1° , it is 115° in NO_2^- .
 - SF_6 does not obey octet rule.
 - The bond in H_2^+ ion is longer than that in H_2 molecule.
 - He_2 does not exist.
- Using molecular orbital theory, draw the energy level diagrams for O_2 and N_2 molecules, calculate the bond order and predict the magnetic properties for each of them.
- Based on VSEPR theory, draw the geometrical shapes for PF_6^- and Ph_4As^+ ions.

Second question: Answer **Only Three** from the following: (13 Marks)

- Draw the Lewis structures for each of the following: NO_3^- and POCl_3 then calculate the formal charge for each atom in both.
- Calculate the effective nuclear charges for the outermost electron in Ar and K atoms.
- State the following:
 - De Broglie's hypothesis
 - Pauli's exclusion principle
- Choose the correct answer:
 - The hybrid orbitals for B in BH_3 is.....
 - sp^3d
 - sp
 - sp^2
 - sp^3
 - Which of the following is the correct set of quantum numbers for the outermost electron of sodium atom?
 - $n = 3, \ell = 3, m_\ell = 2, m_s = -1/2$
 - $n = 3, \ell = 2, m_\ell = 0, m_s = -1/2$
 - $n = 3, \ell = 1, m_\ell = 0, m_s = +1/2$
 - $n = 3, \ell = 0, m_\ell = 0, m_s = -1/2$
 - In which of the following, the central atom is surrounded by 4 electron pairs:
 - H_2O
 - NH_3
 - CH_4
 - all
 - The geometrical shape of PCl_5 is
 - tetrahedral
 - square planer
 - linear
 - triangle bipyramidal

(Atomic numbers: H = 1, He = 2, B = 5, C = 6, N = 7, O = 8, F = 9, Na = 11, P = 15, S = 16, Cl = 17, Ar = 18, K = 19, As = 33)

Good Luck

Dr. AbdelRahman A. Dahy

Please turn over for Section B 

Section B (25 Marks)

Answer all the following questions:

First question: Answer Only Three from the following: (6 Marks)

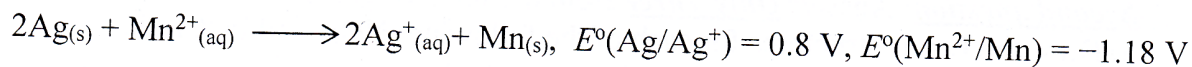
- (a) Compare between lyophilic and lyophobic sols.
- (b) Calculate the density of CO gas at STP conditions.
- (c) 10 L of an unknown gas has a mass of 10.8 grams at a temperature of 310 K and 1.2 atm. What is the molar mass of the gas?
- (d) Compare between physisorption and chemisorption.

Second question: Answer the following: (9 Marks)

- (a) State Boyle's law and derive it from kinetic theory of gases.
- (b) How can you prepare colloidal solution of gold by two different methods?
- (c) Explain why:
 - i- Zinc metal will displace hydrogen from acid solution.
 - ii- The hydrogen gas has Z-P curve above the ideal behavior.
 - iii- Real gases deviate from the ideal behavior.
 - iv- Vapor pressure of liquids increases with temperature increase.

Third question: Answer Only Two from the following: (10 Marks)

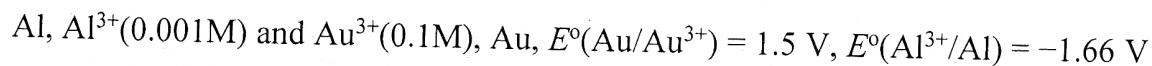
- (a) For the following reaction:



- i- Write the cell reaction.
- ii- Write the cell representation.
- iii- Calculate the cell potential.
- iv- Predict the reaction feasibility?

- (b) 25.8 liter of a gas has a pressure 690 torr and a temp. 27°C. What will be the volume if the pressure is changed to 1.9 atm. and the temp. 350 K.

- (c) Calculate the emf of the cell:



Atomic weights (H=1, C = 12, N =14, O =16)

Good Luck

Dr. Mohamed N. Abd El-Hameed



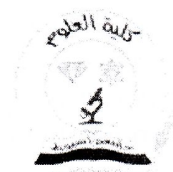
First Semester Exam - December 2017

Course: English Language (2)

Time Allowed: Two Hours

Total Score: 50 Marks

Date: 20-12-2017



Answer the following questions.

I- Terminology.

(15 Marks)

Give the full definition of only FIVE of the following:

- | | | |
|---------------|--------------------|-------------|
| 1. Science | 2. Physical change | 3. Matter |
| 4. Technician | 5. Condensation | 6. Freezing |

II- Morphemes and word formation.

(15 Marks)

A. Write the antonym of the words indicated by adding the proper affix.

1. Legal 2. Centralization 3. Conductor 4. Sense 5. Lead

B. By using affixes, give the noun-agent of:

1. Art 2. Electric 3. Sculpture 4. Engine 5. Mission

C. Name the process of word formation that produced the following.

1. NATO 2. Skyscraper 3. Must (n.) 4. MP3 5. Babysit

III- Reading comprehension

(20 Marks)

A. Read the text then answer the following questions.

The largest of the world's 17 penguin species, emperor penguins stand nearly four feet and weigh up to 90 pounds. These sea birds never set foot on dry land. **(i)** An estimated 200,000 breeding pairs live in about 40 penguin colonies scattered along the coasts of Antarctica. **(ii)** Their waterproofed feathers, flipper-like wings, and streamlined bodies make them excellent swimmers and divers. On ice they can travel distances up to 50 miles by "tobogganing"—gliding on their stomachs while pushing with their wings and feet.

(iii) Emperor penguins breed during the Antarctic winter in some of the world's most severe weather conditions (temperatures of -80 F and winds up to 112 miles per hour). Breeding during the winter allows chicks to mature in midsummer when food is plentiful. After the female lays a single egg, the male holds it in a fold of skin near his feet for a two-month incubation period. During this time he huddles with other males to keep warm. **(iv)** The male moves very little and does not eat, usually losing up to a third of his body weight. Meanwhile the females go to sea and dive for fish so that when they return they can feed and care for the newly hatched chicks. After the male restores his body weight, both parents take turns caring for their young.

The world's emperor penguin population declined in the last 50 years due to a period of warming ocean temperatures. Warm water shrinks ice cover and reduces the population of krill—a small crustacean that is the emperor penguin's staple food. Today the emperor penguin population has stabilized, but warming trends could again threaten this magnificent sea bird.

1. What is the author's main purpose in this passage?
 - a. to describe the recent plight of the emperor penguin
 - b. to show the differences between penguin species
 - c. to describe the characteristics and breeding practice of the emperor penguin
 - d. to describe the eating habits of the emperor penguin
2. Which of the following is NOT true of the emperor penguin?
 - a. They can travel 50 miles by gliding.
 - b. They breed during Antarctic summer.
 - c. The male incubates the egg.
 - d. They can withstand severe weather.
3. The word *stabilized* in paragraph 3 is closest in meaning to
 - a. held steady.
 - b. increased.
 - c. slowed.
 - d. fluctuated.
4. The passage suggests that
 - a. the female emperor penguin should take better care of her young.
 - b. no animal can survive in subzero temperatures.
 - c. scientists have never been close enough to observe the emperor penguin.
 - d. changes in the global environment can threaten the emperor penguin.
5. What makes up the staple diet of the emperor penguin?
 - a. cuttlefish
 - b. krill
 - c. seaweed
 - d. fried clams
6. Where in the passage does the author describe the characteristics that make emperor penguins excellent swimmers?
 - a. at the beginning of paragraph 1
 - b. at the end of paragraph 1
 - c. at the beginning of paragraph 2
 - d. at the end of paragraph 2
7. Why do male emperor penguins form a huddle?
 - a. to protect the eggs from sea lions
 - b. to share their food supply
 - c. to maintain body heat in harsh temperatures
 - d. to share parenting advice

3 The government considered various options, including desalination and piping water in from Europe. Oil exploration had already revealed that there were vast aquifers beneath Libya's deserts, but **these** were far from where people lived. Economists looked into the feasibility of piping this water to the coast, and decided that this was by far the cheapest option. The Great Man-Made River Project was inaugurated in August 1984, when the president laid the foundation stone for a pipe-manufacturing factory. **4** The Great Man-Made River Project is in fact a network of pipelines, being constructed in a series of phases, which will take water from the desert aquifers to the coastal cities, and eventually to irrigate agricultural land. Phase I, transporting much-needed fresh water to Benghazi, was completed in 1993. Three years later Phase II began supplying water to the capital Tripoli. Phase III will link the pipelines in Phases I and II, and is still under construction. A further two phases will complete the network.

5 The scale of the project is impressive. As well as the 4-metre diameter pipes which carry the water throughout the network, the project requires huge reservoirs and holding tanks, new wells, pumping stations and chlorination plants to be constructed. Roads have been built alongside the pipeline trenches to allow trucks to deliver the pipes.

6 When the project began, Libya did not have the engineering experience required for such a vast undertaking and relied on experts from a number of foreign countries. Now parts of the project, such as the factory which manufactures the pipes, are run completely by Libyans and Libya is a world leader in hydrological engineering.

7 Phases I and II have already transformed the lives of people who for the first time have access to fresh water. But perhaps the most ambitious aspect of the project is the plan to use water for agriculture. Libya hopes to be able to end its dependence on imports for crops such as wheat and oats by irrigating 130,000 hectares of land for farming. In some of the coastal areas the soil is very fertile. **Eventually**, it hopes to start exporting crops to Europe and the Middle East.

1. _____ were NOT needed for the project.

- a. New roads b. New reservoirs c. Desalination plants d. Foreign engineers

2. The pipes used in the project are four meters in _____.

- a. length b. thickness c. diameter d. depth

3. The first step in the project was _____.

- a. building roads b. finding the water
c. training engineers d. building a pipe factory

4. The project in total is comprised of _____ phases.

- a. three b. four c. five d. six

5. A part of the project now completely run by Libyans is _____.

- a. the chlorination plants b. the planning and design
c. the pipe factory d. a, b, and c

6. When the project began, Libya did not have _____.

- a. engineering experience b. a major need for water
c. aquifers in the desert d. a, b, and c

Best Wishes Dr. Marwa M. Abdelmotaleb

Dr. Sherin A. Mohamed