

جامعة أسيوط - كلية العلوم

إدارة المكتبات

امتحانات

الفصل الدراسي الصيفي

للعام الجامعي

٢٠١٦-٢٠١٧م

قسم الكيمياء





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Final exam, Faculty Students (Summer Semester 2017)
Scientific Thinking (UR 014)

Total score: 50 marks

Time allowed: 2 hours

I- Answer TWO questions only from the following:

Question No. 1: Write briefly on: (15 marks)

- a- Major landmarks of science from old world to modern ages. (10 marks)
- b- Features of early human stages of scientific thinking. (5 marks)

Question No. 2: Write shortly on: (15 marks; 5 marks each)

- a- Totalitarianism and certainty.
- b- Science/technology relationship.
- c- Precision and intonation.

Question No. 3: (15 marks)

- Give an account on the main checklist items of scientific reasoning.

II- Answer the following questions:

Question No. 4: (5 marks)

- Mention main universal intellectual standards important to sound scientific thinking.

Question No. 5: Choose if the following are (right) or (wrong): (10 marks; 1/2 mark each)

1. Collecting data that opposes theoretical backgrounds of a given research is recommended.
2. One of the main obstacles in the way of science is the existence of "Myths".
3. Scientific assumption is an essential element of scientific thought.
4. Recently science and scientific thinking showed minor advances.
5. The item "scientific concepts" means the interpretation of data and observations.
6. The logic of "Zoology" research is the scientific investigation of all life forms.
7. Scientists need to explain how the physical world operates through experiments.
8. A statement can be clear, accurate, precise but not relevant.
9. Scientific thinking is characterized by features such as cumulative aspects and is negatively influenced by, for example, misleading media or authority.
10. The item "scientific question and issue" refers to the collection of data and observations.

Question No. 6: Complete the missing word(s): (5 marks; 1 mark each)

- a- Botanists aim mainly to analyze, classify and come to understand all forms of.....
- b- A hypothesis is an educated guess about
- c- acquire authority if released by experienced people.
- d- negatively affects free thinking that someone has the truth and others not.
- e- Investigating complexities and difficulties around a scientific issue is termed "....."

Good Luck

Examiner: Prof. Dr. Magdy S. Mahmoud

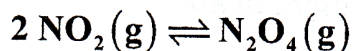
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Section (B)

Answer only Five from the following:

(25 Marks)

1. The reaction below has an equilibrium constant of 171 at 25 °C. Which direction will the reaction proceed in order to establish equilibrium if 2.0×10^{-3} mol NO_2 and 1.5×10^{-5} mol N_2O_4 are combined in 10.0 L flask.



2. Calculate the pH of a solution that is both 1M CH_3COOH and 1M CH_3COONa ? ($K_a = 1.8 \times 10^{-5}$). What will be the pH after addition of HCl which reacts with 2% of sodium acetate?
3. For the system: $\text{A}(\text{g}) + 2\text{B}(\text{g}) \rightleftharpoons \text{C}(\text{g})$
The equilibrium concentrations are $[\text{A}] = 0.06$ mol/l, $[\text{B}] = 0.12$ mol/l and $[\text{C}] = 0.216$ mol/l. Calculate the values of both K_c and K_p at 250 °C. ($R = 0.082$ L.atm.mol⁻¹.K⁻¹)
4. Calculate the solubility (in g/100ml) of Ag_2SO_4 in 1M aqueous Na_2SO_4 solution. ($K_{sp} = 1.4 \times 10^{-5}$) At 18°C. (Atomic weights: Ag = 107.9, S = 32 and O = 16).
5. What $[\text{H}^+]$ that must be maintained in a saturated H_2S solution (0.1M) to precipitate CdS but not ZnS if Cd^{2+} and Zn^{2+} are each present initially at a concentration of 0.1M. [K_{sp} of CdS = 8×10^{-27} , K_{sp} of ZnS = 1×10^{-21} and K_a of $\text{H}_2\text{S} = 1 \times 10^{-21}$]
6. A solution of 0.45 g of urea in 22.5 g of water gave a boiling point elevation of 0.17 °C. Calculate the molal elevation constant of water. (M. Wt. of urea = 60 g/mol)
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Best Wishes

Examiners: Prof. Dr. Hassan El-Sherief and Dr. Mohamed Abdel megeed



Final Examination of General Chemistry (2) (C-105) for 1st level students

Section (A): Organic Chemistry

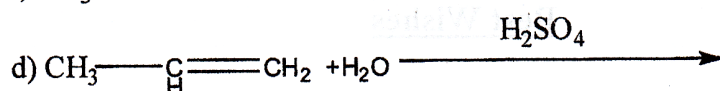
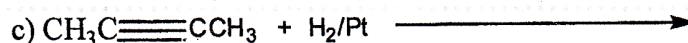
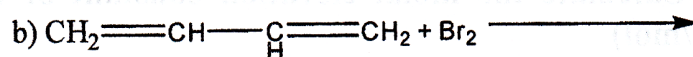
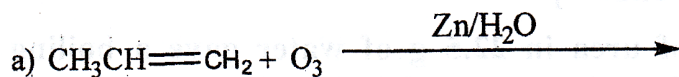
(25Marks)

Answer the following questions:

Question 1:- Mark (✓) for the right statement and (X) for the wrong one for eight Only of the following: (12 Points)

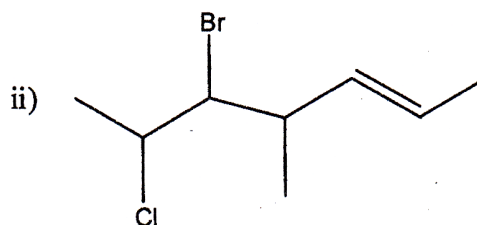
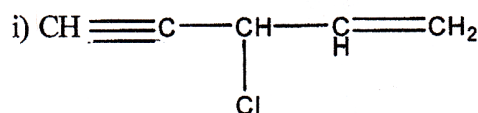
- (a) The C—Cl bond is a polar covalent *bond* ()
- (b) Carbocations are intermediates in electrophilic addition reactions ()
- (c) Nucleophiles are electron rich reagents ()
- (d) Addition of HBr to an unsymmetrical alkene is regioselective reaction. ()
- (e) The eclipsed conformation of ethane is more stable than its staggered one ()
- (f) The atomic orbitals which overlap to form a C-H bond of ethane are sp and 1s ()
- (g) Conformational isomers are compounds with the same structural formula but the atoms located in different positions in space. ()
- (h) The angle between hybrid orbitals increase with increasing the s character. ()
- (i) The $\equiv\text{C-H}$ bond in ethyne is more shorter, stronger and acidic than that of ethane ()
- (j) The heterolytic fission of C-C bond gave two radicals. ()

Question 2: Complete three Only of the following equations: (6 Marks)



Question 3: a) Give the IUPAC name of the following:

(7 Marks)



b) Draw the reaction energy diagram of two steps reaction that is slightly exothermic?

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Section II, Physical Chemistry

(Mark: 25)

Answer the following questions

I) Choose the correct answer:

(Marks: 10)

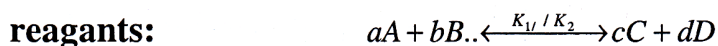
- 1) The absolute temperature is: $T = t + \dots$ a) ΔH° , b) α , c) $\frac{1}{\alpha}$, d) R
- 2) If ΔE° Positive that means: a) $Q < W$ b) $Q > W$, c) $Q = W$
- 3) Under isothermal expansion of ideal gas: $\Delta S = \dots$
a) $nRT \ln \frac{V_2}{V_1}$, b) $nR \ln \frac{V_2}{V_1}$, c) $C_p \ln T$, d) $C_v \ln P$
- 4) Under adiabatic expansion of an ideal gas system: $\Delta Q = \dots$
a) ΔW b) ΔE c) ΔH d) Zero
- 5) For irreversible process: $\Delta G^\circ = \dots$ a) ΔQ , b) ΔH° c) < 0.00

II) Complete the Following:

- 1) For reversible isothermal expansion and constant P of an ideal gas system: $\Delta S = \dots$

2) $\frac{d \ln K}{dT} = -\frac{\dots}{\dots}$ 3) $\ln K = \frac{\dots}{\dots} + \frac{\dots}{\dots}$ 4) $\frac{d(\ln K)}{d(1/T)} = -\frac{\dots}{\dots}$

- 5) The ΔG° for any process involving arbitrary concentrations of



Can be expressed as: $\Delta G^\circ = \Delta G^{\circ 0} + \dots$

- III) Show that under adiabatic conditions for the expansion of an ideal gas: $PV^\gamma = \text{Constant}$ (Mark: 5)

- II) Show, how can you calculate the work done (W) in each operation, maximum work ($W_{\max}$), and efficiency (η) during Carnot cycle (Mark: 5)

- IV) The equilibrium constant for the reaction $2NO_{2(g)} \xrightleftharpoons{K} N_2O_{4(g)}$ is:

$K_1 = 9.5$, at $T = 310.K$, $\Delta H^{\circ 0} = -14.75 \text{ kcal/mol}$,
and $R = 1.98 \text{ cal/mol-deg}$

Calculate: (i) K_2 , at $T = 275.K$, (ii) $\Delta G^{\circ 0}$ at $T = 310.K$ (Mark: 4)

Good Luck

Examiner: Prof. Dr. Seddique M Ahmed



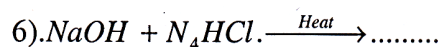
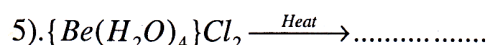
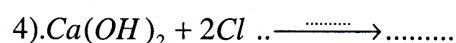
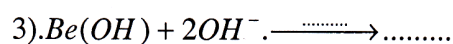
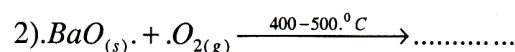
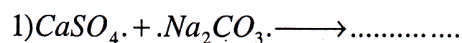
Final Exam of Inorganic and Physical Chemistry (Mark:50)

Section I (Inorganic Chemistry) (Mark: 25)

I) Write the chemical symbol (Five only) of the following:

- 1) Magnesium bicarbonate, 2) Beryllium peroxide, 3) Aluminum carbide, 4) Urea, 5) pyrophosphoric acid, 6) Gypsum.

II) Complete the (Five Only) Following Equations:



III) 1) Draw the chemical structure of monomer, dimer and polymer structure of beryllium chloride.

2) Discuss the position of Hydrogen in the periodic Table.

IV) 1) Explain by equations the amphoteric character of Beryllium and Aluminum oxide.

2) Discuss by examples the oxidation state of group VIA

V) The hardness of water may be "Temporary or permanent"
Discuss each of these? How is each removed?

See next page