16.5/30 +1 +1.5 = 18.5/30

Jordan University of Science and Technology
Chemistry Department
Chem 103
Second Exam 3/ 12/ 2011

Name: **Student Number:**

Serial number: 7 **Section Number:** 20 **Instructor' Name:** د. سعادات نوفل

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
D	A	B	C	A	C	A	C	C	D	A	B	D	C	B	B	D	C	D	D

Instructions:

1. Use a pen in your answer and write in CAPITAL LETTERS.
2. R= 0.0821 atm. L/mol. K = 8.314 J/mol. K, 1 atm=760 torr= 101325 Pa= 760 mmHg,

1A												3A	4A	5A	6A	7A	8A
1 H 1.008	2A											5 B 10.81	6 C 12.01	7 N 14.01	8 O 15.99	9 F 18.99	2 He 4.003
3 Li 6.941	4 Be 9.01											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	10 Ne 20.18
11 Na 22.98	12 Mg 24.30	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B						18 Ar 39.95
19 K 39.09	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 51.99	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.8

Choose the most appropriate answer of the following multiple choice questions and write it on the cover page. (1.5 marks for each question).

1	How many valence electrons are there in the Lewis structures of a Al^{+3} ion? A) 8 B) 5 C) 3 D) 0
2	The atomic radius of main-group elements generally decreases going up a group because A) effective nuclear charge increases B) effective nuclear charge decreases C) The principal quantum number of the valence orbitals decreases D) the principal quantum number of the valence orbitals increases
3	3) Which of the following has the lowest lattice energy? A) $CaCl_2$ B) CaO C) NaCl D) NaF
4	A triple bond consists of _____ pairs of electrons shared between two atoms. A) 1 B) 2 C) 3 D) 4
5	If 50.75 g of a gas occupies 20.0 L at STP, what is the volume (L) of 129.3 g of this gas at STP? A) 3.92 B) 51.0 C) 12.9 D) 25.5
6	What will be the volume of a gas (V2) if its pressure is changed to one half and its temperature in kelvin (K) is doubled? A) V2=4V1 B) V2=V1 C) V2=0.25V1 D) V2=2V1
7	The ability of an atom in a covalent chemical bond to attract electrons to its side is described as: A) paramagnetism B) electronegativity C) diamagnetism D) electron affinity

8 Which one of the following aqueous solution has the highest vapor pressure?
A) 0.10 m $KClO_4$ B) 0.15 $Ca(ClO_4)_2$ C) 0.10 m $Al(ClO_4)_3$ D) 0.15 m NaCl

9 A solution containing 4.15 g of nonvolatile substances dissolved in 1 mol of chloroform ($CHCl_3$) has va pressure of 68.1 Kpa. The vapor pressure of pure $CHCl_3$ at same temp is 70.1Kpa. Calculate the molar m of the solute?
A) 333 B) 283 C) 141 D) 276

10 What volume (L) of N_2 is formed from complete decomposition of 195 g of sodium azide (NaN_3) at 25.0 and 763 torr? $2NaN_3\,(s) \rightarrow 2Na\,(s) + 3N_2\,(g)$
A) 49 B) 73 C) 33 D) 110

11 Which of the following is the correct increasing atomic/ionic radius order?
A) $K^+ < Kr < Se^{2-} < As^{3-}$ B) $As^{3-} < Se^{2-} < Kr < K^+$
C) $K^+ < Kr < As^{3-} < Se^{2-}$ D) $Kr < K^+ < Se^{2-} < As^{3-}$

12 SO_2 (5.00 g) and CO_2 (5.00 g) were placed in a 750.0 mL container at 50.0 °C. The partial pressure (atm) SO_2 in the container is.
A) 4.02 B) 2.76 C) 1.60 D) 0.192

13 The density of air at STP is 1.285 g/L. Which of the following cannot be used to fill a balloon that will flo in air at STP?
A) CH_4 B) NH_3 C) Ne D) Ar

14 A sample of CH_4 gas (2.0 mmol) effused through a pinhole in 5.5 second. It will take .....seconds for the same amount of N_2 to effuse under the same conditions
A) 3.1 B) 4.2 C) 7.3 D) 5.5

15 100 mL of Cl_2 gas is reacted with 150 mL of C_2H_4 gas according to the following equation:
$Cl_2\,(g) + C_2H_4\,(g) \rightarrow C_2H_4Cl_2\,(g)$
What is the volume of the product ($C_2H_4Cl_2$) in **ml**, if the temperature and pressure are kept constant?
A) 100 B) 50 C) 25 D) 150

16 A solution is prepared by dissolving 23.7 g of $CaCl_2$ in 375 g of water. The density of the resulting solutio is 1.05 g/mL. The concentration (% by mass) of $CaCl_2$ is:
A) 6.32 % B) 5.94 % C) 0.0632 % D) 0.0594%

17 What is the molality of sodium chloride in a solution that is 20.0% by mass sodium chloride (MM= 58.5 g/mol) and that has a density of 1.10 g/mL?
A) 4.27 B) 2.55 C) 3.41 D) 2.22

18 A solution containing 5.0 g of an unknown liquid and 45.0 g water has a freezing point of -3.33 °C. Giv K_f = 1.86 °C/m for water, the molar mass (g/mol) of the unknown liquid is
A) 69.0 B) 333 C) 62.1 D) 161

19 Which of the following substances has the greatest ionic character in its bonds?
A) LiCl B) KCl C) $BeCl_2$ D) $CaCl_2$

20 Arrange the gases according to decreasing the rate of effusion:
A) $CH_4 < Ne < Ar < Cl_2$ B) $CH_4 < Ne < Cl_2 < Ar$
C) $Cl_2 < Ar < Ne < CH_4$ D) $Ne < CH_4 < Ar < Cl_2$

GOOD LUCK!