



Chem 110, Exam. (2)
Time : 90 min
2010 – 2011 1nd term

Model (C)

Name:	Useful information
Number:	Speed of light, $c = 3.0 \times 10^8$ m/s Gas constant, $R = 0.082$ L atm K ⁻¹ mol ⁻¹ = 8.314 JK ⁻¹ mol ⁻¹
Section:	

With the best wishes

General Chemistry Team work

Periodic Table of the Elements

1 1.00794 H Hydrogen																	2 4.0026 He Helium
3 6.941 Li Lithium	4 9.0122 Be Beryllium											5 10.811 B Boron	6 12.011 C Carbon	7 14.007 N Nitrogen	8 15.999 O Oxygen	9 18.998 F Fluorine	10 20.18 Ne Neon
11 22.990 Na Sodium	12 24.305 Mg Magnesium											13 26.982 Al Aluminum	14 28.086 Si Silicon	15 30.974 P Phosphorus	16 32.066 S Sulphur	17 35.453 Cl Chlorine	18 39.948 Ar Argon
19 39.098 K Potassium	20 40.078 Ca Calcium	21 44.956 Sc Scandium	22 47.88 Ti Titanium	23 50.942 V Vanadium	24 51.996 Cr Chromium	25 54.938 Mn Manganese	26 55.847 Fe Iron	27 58.933 Co Cobalt	28 58.693 Ni Nickel	29 63.546 Cu Copper	30 65.39 Zn Zinc	31 69.723 Ga Gallium	32 72.61 Ge Germanium	33 74.922 As Arsenic	34 78.96 Se Selenium	35 79.904 Br Bromine	36 83.80 Kr Krypton
37 85.468 Rb Rubidium	38 87.62 Sr Strontium	39 88.906 Y Yttrium	40 91.224 Zr Zirconium	41 92.906 Nb Niobium	42 95.94 Mo Molybdenum	43 (98) Tc Technetium	44 101.07 Ru Ruthenium	45 102.91 Rh Rhodium	46 106.42 Pd Palladium	47 107.87 Ag Silver	48 112.41 Cd Cadmium	49 114.82 In Indium	50 118.71 Sn Tin	51 121.76 Sb Antimony	52 127.60 Te Tellurium	53 126.90 I Iodine	54 131.29 Xe Xenon
55 132.91 Cs Cesium	56 137.33 Ba Barium	71 174.97 Lu Lutetium	72 178.49 Hf Hafnium	73 180.95 Ta Tantalum	74 183.85 W Tungsten	75 186.21 Re Rhenium	76 190.2 Os Osmium	77 192.22 Ir Iridium	78 195.08 Pt Platinum	79 196.97 Au Gold	80 200.59 Hg Mercury	81 204.38 Tl Thallium	82 207.2 Pb Lead	83 208.98 Bi Bismuth	84 (209) Po Polonium	85 (210) At Astatine	86 (222) Rn Radon
87 (223) Fr Francium	88 226.03 Ra Radium	103 (260) Lr Lawrencium	104 (261) Rf Rutherfordium	105 (262) Db Dubnium	106 (263) Sg Seaborgium	107 (262) Bh Bohrium	108 (265) Hs Hassium	109 (266) Mt Meitnerium	110 Un Unnamed	111 Un Unnamed							

57 138.91 La Lanthanum	58 140.12 Ce Cerium	59 140.91 Pr Praseodymium	60 144.24 Nd Neodymium	61 (145) Pm Promethium	62 150.36 Sm Samarium	63 151.96 Eu Europium	64 157.25 Gd Gadolinium	65 158.93 Tb Terbium	66 162.50 Dy Dysprosium	67 164.93 Ho Holmium	68 167.26 Er Erbium	69 168.93 Tm Thulium	70 173.04 Yb Ytterbium
89 (227) Ac Actinium	90 232.04 Th Thorium	91 231.04 Pa Protactinium	92 238.03 U Uranium	93 237.05 Np Neptunium	94 (244) Pu Plutonium	95 (243) Am Americium	96 (247) Cm Curium	97 (247) Bk Berkelium	98 (251) Cf Californium	99 (252) Es Einsteinium	100 (257) Fm Fermium	101 (258) Md Mendelevium	102 (259) No Nobelium

Directions: For each of the following questions, choose the letter that **best** answers the question and place it on your answer sheet.

[1] If 2.52 moles of hydrogen gas(H_2) is introduced into 12.2 L flask at 0^0 C .What is the pressure of this gas ?

- A. **46.3 atm.**
- B. 14.3 atm.
- C. 43.8 atm.
- D. 64.6 atm.

[2] A polar covalent bond would form in which one of these pairs of atoms?

- A. **P—Cl**
- B. **Si—Si**
- C. **Cr—Br**
- D. **Cl—Cl**

[3] The element $[Ne]3s^23p^6$ is in ____ group of the periodic table .

- A. 1A
- B. 5A
- C. **8A**
- D. 8B

[4] What are the standere temperature and pressure(STP)?

- A. **273K,1atm**
- B. 250 K,1 torr
- C. 25^0 C ,1atm
- D. 0^0 C,1 torr

[5] A mixture of gases contains 4.46 moles of Ne and 0.74 mole of Ar. Calculate the partial pressure of the Ne gas if the total pressure is 1.51 atm?

- A. 0.247 atm
 - B. **1.295 atm**
 - C. 2.314 atm
 - D. 0.765atm
-

[6] Which of these elements has the greatest electron affinity (largest positive value)?

- A. **P**
- B. Al
- C. Si
- D. Mg

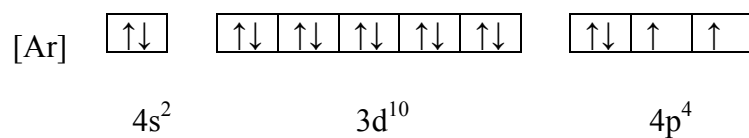
[7] A ground –state atom of Mn^{+2} has -----unpaired electrons and is -----.

- A. 2,paramagnetic
- B. 4,diamagnetic
- C. **5, paramagnetic**
- D. 0,diamagnetic

[8] Which of these compounds does not follow the octet rule?

- A. **PF_4^-**
- B. NF_3
- C. CO_2
- D. Br_2

[9] Which ground - state atom has an electron configuration described by the following orbital diagram:



- A. Phosphorus(P)
- B. Germanium(Ge)
- C. **Selenium(Se)**
- D. Arsenic(As)

[10] TheLewisistructure for CS_2 is:

- A. $\ddot{\text{C}}=\ddot{\text{S}}-\ddot{\text{S}}$
- B. $\ddot{\text{S}}-\ddot{\text{C}}-\ddot{\text{S}}$
- C. $\ddot{\text{S}}=\ddot{\text{C}}-\ddot{\text{S}}$
- D. **$\ddot{\text{S}}=\text{C}=\ddot{\text{S}}$**

[11] Which of the following is/ are characteristic(s) of gases?

- A. Relatively small distances between molecules
- B. Formation of heterogeneous mixtures regardless of the nature of gases
- C. uncompressibility and relatively small distances between molecules
- D. **High compressibility, relatively large distances between molecules and formation of homogeneous mixtures regardless of the nature of gases**

[12] Which of these pairs consists of *isoelectronic* species?

- A. Mn^{2+} and Ar
- B. **K^+ and Cl^-**
- C. Zn^{2+} and Cu^{2+}
- D. Na^+ and K^+

[13] The representative elements are those with unfilled energy levels in which the "last electron" was added to

- A. **an *s* or *p* orbital.**
- B. an *s* orbital.
- C. a *p* or *d* orbital.
- D. an *f* orbital.

[14] Choose the incorrect quantum numbers for electron in an atom?

- A. (3, 0, 0, +1/2)
- B. **(3, 5, 0, +1/2)**
- C. (1, 0, 0, +1/2)
- D. (4, 3, -2, -1/2)

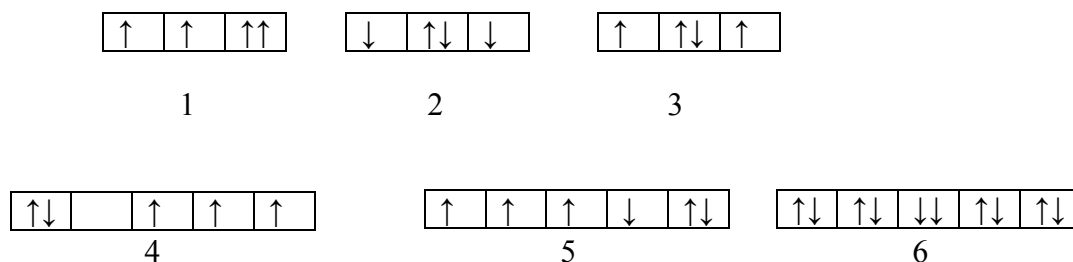
[15] The number of orbital in a *p* subshell is?

- A. 1
- B. 7
- C. 5
- D. **3**

[16] What is the wavelength of radiation that has a frequency of $7.5 \times 10^{14} \text{ s}^{-1}$?

- A. $2.3 \times 10^6 \text{ nm}$
 - B. $4.3 \times 10^{-7} \text{ nm}$
 - C. $2.0 \times 10^{23} \text{ nm}$
 - D. **$4.0 \times 10^2 \text{ nm}$**
-

[17] Which of the orbital diagrams is not follow Hand's rule?



- A. **(1) and(4)**
 B. (1) and(5)
 C. (2) and(3)
 D. (2) ,(4)and(6)

[18] The orbital diagram for a ground state O^{2-} atom is:

- A. $\downarrow\uparrow$ $\downarrow\uparrow$ $\downarrow\uparrow$ $\downarrow\uparrow$ \uparrow
 1s 2s 2p
 B. $\downarrow\uparrow$ $\downarrow\uparrow$ $\downarrow\uparrow$ \uparrow \uparrow
 1s 2s 2p
 C. **$\downarrow\uparrow$ $\downarrow\uparrow$ $\downarrow\uparrow$ $\downarrow\uparrow$ $\downarrow\uparrow$**
 1s 2s 2p
 D. $\downarrow\uparrow$ $\downarrow\uparrow$ \uparrow \uparrow \uparrow
 1s 2s 2p

[19] Element that form diatomic gases among the following ,are:

- A. N,Cl,Br,He
 B. **O,N,F,H**
 C. Ar,N,Cl,F
 D. O,Cl,S,Kr

[20] The electron dot structure for $AsCl_3$ shows

- A. two single bonds, one double bond, and 9 lone pairs.
 B. **three single bonds and 10 lone pairs**
 C. one single bond, two double bonds, and 8 lone pairs.
 D. three single bonds and one lone pair.

[21] The correct order of ionic radius of the following is _____.

- A. $K^+ < S^{2-} < Cl^- < P^{3-}$
 B. $Cl^- < S^{2-} < K^+ < P^{3-}$
 C. **$K^+ < Cl^- < S^{2-} < P^{3-}$**
 D. $K^+ < P^{3-} < S^{2-} < Cl^-$

[22] How many resonance structures for the molecule NO_2 (ONO)

- A. 3
 - B. 1
 - C. **2**
 - D. 4
-

[23] Which of these elements has the *greatest* electronegativity?

- A. N
 - B. **F**
 - C. N
 - D. I
 - E. Cs
-

[24] If 500 mL of a gas at -73°C are heated to 27°C , what is the new volume?

- A. 737 mL
 - B. 850 mL
 - C. 805 mL
 - D. **750 mL**
-

[25] What is the formal charge on the oxygen atom in N_2O (the atomic order is N-N-O)?

- A. +1
 - B. 0
 - C. **-1**
 - D. -2
-

[26] What is the electron configuration of the Cr_{24} ?

- A. $(1s^2 2s^2 2p^6 3s^2 3p^5 4s^2 3d^5)$
 - B. $(1s^2 2s^2 2p^6 3s^3 3p^6 4s^2 3d^3)$
 - C. **$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5)$**
 - D. $(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4)$
-

[27] The second ionization energy of **Mg** is _____ than its first ionization energy, and is _____ than the second ionization energy of **Na**.

- A. lower, lower
 - B. lower, higher
 - C. higher, higher
 - D. **higher, lower**
-

[28] A sample of oxygen gas was collected over water at 26°C and 785 mmHg. The volume of the container was 6.33L. Calculate the mass of O₂(g) collected. (Vapor pressure of water = 20.3 mmHg at 26°C.)

- A. 7.14 g
- B. **8.30 g**
- C. 3.80 g
- D. 6.29 g

[29] The maximum number of electrons that can occupy an energy level described by the principal quantum number, n , is?

- A. n^{+1}
- B. $2n$
- C. n^2
- D. **$2n^2$**

[30] Ionization energy is the energy need when an atom forms a _____.

- A. free radiation
 - B. molecule
 - C. Anion
 - D. **cation**
-