

Course Title: General Chem.
 Date: 11/01/2018
 No. of Questions: (5)
 Time: 2 Hr
 Using Calculator (yes)

University of Palestine



First Semester 2017/2018
 Total Grade: 50

Instructor Name: _____
 Student No.: _____
 Student Name: _____
 Dep. / Specialist: _____

Question one: Multiple choice question (16 points)

<p>1. Metals oxides when dissolved in water, that generates? a) Basic solution b) Acidic solution c) Neutral solution d) Amphoteric solution e) None of above</p>	<p>2. The correct arrangement of length of carbon- carbon bond : a) C-C > C=C > C≡C. b) C=C > C-C > C≡C. c) C=C > C≡C > C-C. d) C≡C > C=C > C-C. e) C≡C = C=C = C-C.</p>
<p>3. Which of the following has the largest radius? a) Co b) Co²⁺ c) Co³⁺ d) Co¹⁺ e) they are all the same size</p>	<p>4. The _____ is the angular quantum number a) N b) L c) ml d) ms e) none of above</p>
<p>5. If a covalent bond were to be formed between a nitrogen atom (electronegativity 3.0) and an oxygen atom (electronegativity 3.5), which of the following statements would best describe such a bond? a) Nonpolar covalent b) Polar covalent c) Ionic d) Coordination bond e) None of mentioned above</p>	<p>6. Which of the following periodic properties is false? a) both electron affinity and ionization energy decreases as you go down a group b) atomic size increases as you go to the right c) ionization energy increases as you go to the right d) atomic size increases as you go down a group e) electron affinity increases as you go to the right</p>
<p>7. The fraction of rate of effusion of iodide atom to oxygen atom a. 0,355 b. 0,335 c. 0,235 d. 0,542 e) 0,587</p>	<p>8. What is the mixing of gases due to molecular motion called a) Diffusion b) Effusion c) Fission d) Fusion e) combustion</p>
<p>9. In the reaction below the spectator ions are $AgNO_3(aq) + HI(aq) \rightarrow AgI(s) + HNO_3(aq)$ a) Ag⁺ and NO₃⁻ b) Ag⁺ and I⁻ c) H⁺ and I⁻ d) H⁺ and NO₃⁻ e) All are spectator ions</p>	<p>10. What is the oxidation number of phosphorus in KH₂PO₄? a) +3 b) +5 c) +7 d) -5 e) +4</p>
<p>11. A triple bond contains ___ sigma bond(s) and ___ pi bond(s). a) 0, 3 b) 3, 0 c) 2, 1 d) 1, 2 e) 3, 2</p>	<p>12. Which of the following has the greatest electron affinity (most negative value)? a) Cl b) K c) He d) Na e) Rb</p>

<p>13. Effective nuclear charge (Z_{eff}) is the “positive charge” felt by an electron. (σ is the shielding constant, Z is the atomic number and r is atomic radius)</p> <p>a) $Z_{\text{eff}} = Z$ b) $Z_{\text{eff}} = Z - \sigma$ c) $Z_{\text{eff}} = \sigma$ d) $Z_{\text{eff}} = r$ e) $Z_{\text{eff}} = \sigma$</p>	<p>14. If $n = 2$ and $l = 1$ (p-orbital), which are the allowed values of $m_l = \dots\dots$</p> <p>a) 0 b) -3, -2, -1, 0, +1, +2, +3 c) -1, 0, +1 d) -2, -1, 0, +1, +2 e) -4, -3, -2, -1, 0, +1, +2, +3, +4</p>
<p>15. The correct dot formulation for nitrogen trichloride has:</p> <p>a) 3 N-CL bonds and 10 lone pairs of electrons. b) 3 N=CL bonds and 6 lone pairs of electrons.. c) 1 N-CL bonds, 2 N=CL bonds and 7 lone pairs of electrons. d) Non of them.</p>	<p>16. Avogadro low state.</p> <p>a. $V \propto T$ b. $V \propto n$. c. $P \propto n$ d. $M \propto m$.</p>

Question two: (12 points)

- a) Calculate the final transition from $n=2$ state of hydrogen atom if the wavelength of light corresponding to this transition is 486 nm. $\Delta E = -2.18 \times 10^{-18} \text{J} (1/n_f^2 - 1/n_i^2)$
- b) Calculate the wavelength of an electron (mass of electron = 9.11×10^{-28} g) which travels at velocity of 500.0 m/s..
- c) Use bond enthalpies to calculate the enthalpy change for:

$$\text{H}_2 (\text{g}) + \text{F}_2 (\text{g}) \rightarrow 2\text{HF} (\text{g})$$
Using these information about bond enthalpies of $\text{H}_2=436.4$ $\text{F}_2=156.9$ $\text{HF}=568.2$

Question three: (12 points)

a) Determine the amount of heat required to raise the temperature of 50 g sample of iron at 21.5 C to 100 C. The heat of capacity of iron is 0.45J/g k.

b) Draw the Lewis structure for the following compounds, determine the molecular shape, arrangement of electron pairs, and angle.

NH₃, CH₄, CO₂

c) A mixture of 6.00 g O₂(g) and 9.00 g CH₄(g) is placed in a 15.0-L vessel at 0 °C. What is the partial pressure of each gas, and what is the total pressure in the vessel? (R = 0.0821L. atm/K. mol)

Question four: (10 points)

a) Given the thermochemical equations



Calculate the enthalpy change for: $2\text{W}(\text{s}) + 2\text{O}_2(\text{g}) \rightarrow 2\text{WO}_2(\text{s})$

b) Use standard enthalpies of formation to calculate the enthalpy change for the reaction:



Substance ΔH_f° (kJ/mol)

$\text{P}_4\text{O}_{10}(\text{s})$ -2940

$\text{H}_2\text{O}(\text{g})$ - 242

$\text{H}_3\text{PO}_4(\text{s})$ -1279

*End of questions
Best wishes*

$$\Delta E = R_H \left(\frac{1}{n_i^2} - \frac{1}{n_f^2} \right)$$

$$\lambda = h/mv = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$c = 3.00 \times 10^8 \text{ m/s}$$

Periodic Table of the Elements

1 IA 1A																	18 VIIIA 8A
1 H Hydrogen 1.008																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 84.798
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.294
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.085	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [298]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown

Lanthanide Series	57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.243	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.055	71 Lu Lutetium 174.967
Actinide Series	89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]

Alkali Metal	Alkaline Earth	Transition Metal	Basic Metal	Semimetal	Nonmetal	Halogen	Noble Gas	Lanthanide	Actinide
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**End of Questions
Good Luck**