Chemistry 115 Name

Dr. Cary Willard

Exam 4A May 19, 2010

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|  | Points Earned | Points Possible |
| Part 1  multiple choice |  | 30 |
| Page 2 |  | 6 |
| Page 3 |  | 18 |
| Page 4 |  | 21 |
| Page 5 |  | 12 |
| Page 6 |  | 15 |
|  |  |  |
| Total |  | 102 |

All work must be shown to receive credit. Show all answers to the proper number of significant figures.

NA = 6.022 x 1023/mol

K = oC+273.16

0oC=273.16 K

Molarity = moles solute/L solution

Mass percent = (mass solute/mass solution) x 100(%)

pH=-log [H3O+]

Grossmont College

Periodic Table

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| IA |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  | VIIA | NOBLE GASES |
| 1  **H**  1.008 | IIA |  |  |  |  |  |  |  |  |  | |  | IIIA | IVA | VA | VIA | 1  **H**  1.008 | 2  **He**  4.002 |
| 3  **Li**  6.941 | 4  **Be**  9.012 |  |  |  |  |  |  |  |  |  | |  | 5  **B**  10.81 | 6  **C**  12.01 | 7  **N**  14.01 | 8  **O**  16.00 | 9  **F**  19.00 | 10  **Ne**  20.18 |
| 11  **Na**  23.00 | 12  **Mg**  24.30 | IIIB | IVB | VB | VIB | VIIB | VIII VIII VIII | | | | IB | IIB | 13  **Al**  27.00 | 14  **Si**  28.09 | 15  **P**  30.97 | 16  **S**  32.06 | 17  **Cl**  35.45 | 18  **Ar**  39.95 |
| 19  **K**  39.10 | 20  **Ca**  40.08 | 21  **Sc**  44.96 | 22  **Ti**  47.90 | 23  **V**  50.94 | 24  **Cr**  52.00 | 25  **Mn**  54.94 | 26  **Fe**  55.85 | 27  **Co**  58.93 | 28  **Ni**  58.70 | | 29  **Cu**  63.55 | 30  **Zn**  65.38 | 31  **Ga**  69.72 | 32  **Ge**  72.59 | 33  **As**  74.92 | 34  **Se**  78.96 | 35  **Br**  79.90 | 36  **Kr**  83.80 |
| 37  **Rb**  85.47 | 38  **Sr**  87.62 | 39  **Y**  88.91 | 40  **Zr**  91.22 | 41  **Nb**  92.91 | 42  **Mo**  95.94 | 43  **Tc**  (99) | 44  **Ru**  101.1 | 45  **Rh**  102.9 | 46  **Pd**  106.4 | 47  **Ag**  107.9 | | 48  **Cd**  112.4 | 49  **In**  114.8 | 50  **Sn**  118.7 | 51  **Sb**  121.8 | 52  **Te**  127.6 | 53  **I**  126.9 | 54  **Xe**  131.3 |
| 55  **Cs**  132.9 | 56  **Ba**  137.3 | 57  **La**  138.9 | 72  **Hf**  178.5 | 73  **Ta**  180.9 | 74  **W**  183.9 | 75  **Re**  186.2 | 76  **Os**  190.2 | 77  **Ir**  192.2 | 78  **Pt**  195.1 | 79  **Au**  197.0 | | 80  **Hg**  200.6 | 81  **Tl**  204.4 | 82  **Pb**  207.2 | 83  **Bi**  209.0 | 84  **Po**  (209) | 85  **At**  (210) | 86  **Rn**  (222) |
| 87  **Fr**  (223) | 88  **Ra**  226.0 | 89  **Ac**  227.0 | 104  **Rf**  (261) | 105  **Db**  (262) | 106  **Sg**  (263) | 107  **Bh**  (262) | 108  **Hs**  (265) | 109  **Mt**  (266) | 110  **??**  (269) |  | |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 58  **Ce**  140.1 | 59  **Pr**  140.9 | 60  **Nd**  144.2 | 61  **Pm**  (147) | 62  **Sm**  150.4 | 63  **Eu**  152.0 | 64  **Gd**  157.3 | 65  **Tb**  158.9 | 66  **Dy**  162.5 | 67  **Ho**  164.9 | 68  **Er**  167.3 | 69  **Tm**  168.9 | 70  **Yb**  173.0 | 71  **Lu**  175.0 |
| 90  **Th**  232.0 | 91  **Pa**  231.0 | 92  **U**  238.0 | 93  **Np**  (237) | 94  **Pu**  (244) | 95  **Am**  (243) | 96  **Cm**  (247) | 97  **Bk**  (247) | 98  **Cf**  (251) | 99  **Es**  (252) | 100  **Fm**  (257) | 101  **Md**  (258) | 102  **No**  (259) | 103  **Lr**  (260) |

Lanthanide series

Actinide series

Part 1 – Multiple Choice (30 points)

1. Which phase change is sublimation?
   1. Solid to gas
   2. Liquid to gas
   3. Gas to liquid
   4. Solid to liquid
2. A volatile substance
   1. Melts with great difficulty
   2. Freezes readily
   3. Condenses easily
   4. Evaporates readily
3. The normal freezing point of water is zero degrees Celsius. What is its normal melting point?
   1. -1° C
   2. 0° C
   3. 1° C
   4. 100° C
4. At which temperature would the solubility of CO2 gas be the highest?
   1. 10. ° C
   2. 20. ° C
   3. 30. ° C
   4. 40. °C
5. Liquids which are capable of mixing and forming a solution are
   1. Unsaturated
   2. Dilute
   3. Miscible
   4. Immiscible
6. Which is the hydronium ion?
   1. H +1
   2. H3O +1
   3. OH -1
   4. OH2 -1
7. Which is a conjugate acid base pair in the following equation?

H3PO4 + H2O 🡪 H3O +1 + H2PO4 -1

* 1. H3PO4 and H2O
  2. H3O +1 and H2PO4 -1
  3. H2O and H3O +1
  4. H3PO4 and H3O +1

1. Which form of nuclear emission requires the greatest amount of shielding to provide protection from radiation injury?
   1. Alpha
   2. Beta
   3. Gamma
   4. All require the same amount
2. In a nuclear reactor, the purpose of the control rods is to
   1. Convert steam into electricity
   2. Capture neutrons to slow the rate of fission
   3. Cool the steam generated by the reactor
   4. Produce neutrons to increase the rate of fission
3. Which is true about ionizing radiation?
   1. It dislocates bonding electrons and creates ions
   2. It can damage DNA molecules
   3. Both large acute doses and small chronic doses are harmful
   4. All the above are true
4. Two or more different compounds with the same molecular formula are
   1. Isomers
   2. Isotopes
   3. Hypermeres
   4. Hypertopes
5. Sugars are examples of
   1. Nucleic acids
   2. Proteins
   3. Hydrocarbons
   4. Carbohydrates
6. At room temperature fats exist as
   1. Solids
   2. Liquids
   3. Gases
   4. Crystals
7. Proteins are polymers of
   1. Amino acids
   2. Glucose
   3. Glycerol
   4. Amylose
8. Which usually functions as a catalyst for biochemical reactions?
   1. Fats
   2. Oils
   3. Carbohydrates
   4. Enzymes

**Part 2 – Problems and Questions (75 points)**

1. (6 points) Indicate whether each of the following will form solutions with water. Explain your reasoning

|  |  |  |
| --- | --- | --- |
|  | Soluble | Explanation |
| KCl(s) | Yes No | Salts or ionic compounds are generally water soluble because they are polar. |
| Hexane (C6H14) | Yes No | Hexane is non polar and will not dissolve in the very polar water. |
| Ethanol (CH3CH2OH) | Yes No | Polar ethanol will dissolve in polar water. |

1. (8 points) A solution is prepared by dissolving 83.45 grams of potassium bicarbonate (KHCO3) in 524.6 grams of water Calculate the mass percent potassium bicarbonate in the solution.

If the density of the solution is 1.24 g/mL, what is the molarity of the solution?

1. (4 points) Calculate the number of grams of silver nitrate required to prepare 250.0 mL of a 0.3714 M solution AgNO3.
2. (6 points) If you want to make 800.0 mL of a 0.4545 M solution of oxalic acid from a stock solution of 6.320 M oxalic acid, how much of the concentrated solution do you need?
3. (4 points) Write the correct chemical formula for the following acids
   1. Hydroiodic acid

HI

* 1. Phosphoric acid

H3PO4

1. (6 points) A solution has an H3O+ concentration of 6.74 x 10-10 M.
   1. Determine the pH of the solution.
   2. Determine the pOH of the solution.
2. (3 points) A solution has a pH of 5.498. Calculate the hydronium ion concentration in the solution.
3. (4 points) Gold-198 is a beta emitter used to assess kidney activity. Write the equation for the decay of gold-198
4. (4 points) What is the difference between fission and fusion?

Fission is the splitting of atomic nuclei to form smaller atoms resulting in the release of energy.

Fusion is the fusion of smaller nuclei to make a larger nucleus resulting in the release of energy

1. (8 points) A 25.00 ml sample of citric acid was titrated with 34.64 ml of 0.9455 M NaOH. Calculate the molarity of citric acid in the sample. (Hint: the table below may help to organize your thoughts to solve this problem.

H3C6H5O7 + 3 NaOH ⎯→ Na3C6H5O7 + 3 H2O

|  |  |
| --- | --- |
| Moles NaOH used to titrate sample |  |
| Moles citric acid in the sample |  |
| Molarity citric acid |  |

1. (4 points) The half-life of oxygen-15 is 124 seconds. If a sample of oxygen-15 has an activity of 4000Bq, how many minutes will elapse before it reaches an activity of 500 Bq? (Note: Becquerel (Bq) is a unit of radioactive activity proportional to the amount of radioisotope present.)

The sample will decay to 500 Bq in 3 × 124 sec = 372 sec or 6.2 min

1. (3 points) Give the IUPAC name of

4-ethyl-3,5-dimethyl octane

1. (3 points) Draw a condensed structural formula for 2-hexene.



1. (6 points) Draw an example of each of the following types of organic compounds
   1. An aldehyde



* 1. A carboxylic acid



* 1. An alcohol



1. (3 points) Explain how a saturated fat differs from an unsaturated fat in terms of its chemical structure. What is the effect of the relative amount of saturation on the properties of the lipid

Saturated fats contain all carbon carbon single bonds, unsaturated fats contain some carbon carbon double bonds.

Saturated fats tend to be solids whereas unsaturated fats tend to be liquids.