Chemistry 116 Name

Martin Larter

Exam 3a Fall, 2013

Multiple Choice (16 points)

Page 4 (22 points)

Page 5 (14 points)

Page 6 (19 points)

Page 7 (15 points)

Page 8 (24 points)

Total (110 points)

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

Multiple Choice (2 points per question)

1. A racemic mixture

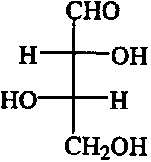
a) Rotates polarized light to the right b) rotates polarized light to the left

c) Does not rotate polarized light d) unequal concentration of enantiomers

1. Which of the following correctly describes the relationship between the dextro/levo system and +/- system associated with optically active compounds?
   1. all dextrorotatory compounds are (+)
   2. all levorotatory compounds are (+)
   3. no levoroatrory compounds are +, but some dextrorotator compounds are (-)
   4. there is no general relationship between the dextro/levo designations and the +/- designations
2. The cyclic form of glucose occurs because of the formation of:

a. ester b. hemiacetal c. amide d. acetal

1. The following structure is shown in



|  |  |
| --- | --- |
| a. | a D form |
| b. | an L form |
| c. | neither D nor L |
| d. | both D and L |

1. Structurally, glycogen is most similar to:

a. cellulose b. amylose c. amylopectin d. sucrose

1. Fatty acids usually have \_\_\_\_.

|  |  |
| --- | --- |
| a. | an odd number of carbon atoms |
| b. | an even number of carbon atoms |
| c. | an odd number of oxygen atoms |
| d. | an odd number of oxygen atoms and an odd number of carbon atoms |

1. Phosphoglycerides differ from glycerides in that one of the hydroxyl groups of glycerol is esterified with

|  |  |
| --- | --- |
| a. | phosphoric acid |
| b. | phosphorus |
| c. | choline |
| d. | serine |

1. Which of the following provide a mechanism for the transport of nonpolar molecules through a membrane?

a. active transport b. diffusion c. specific channels d. all of these

Short answer

1. (4 points) Place an asterisk (\*) next to each stereocenter in the following molecule.



How many stereoisomers are possible for this molecule?\_\_\_\_\_\_\_\_\_\_\_\_\_

1. (8 points) Below are the Fischer projections of the fourstereoisomer’s of 2, 4-dichloropentane



Indicate the relationships between the molecules

enantiomers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ diastereomers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Identical:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. (4 points) Indicate whether the following molecules are *R* or *S*

**A** **B**

\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

1. (6 points) Classify each of the following amines as primary, secondary, tertiary, heterocyclic, aliphatic, and/or aromatic. Include all terms that apply.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. (3 points) Provide the IUPAC name for the following structure.



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. (3 points) Draw the structure of Octyl trimethylammonium hydroxide
2. (2 points) Circle the more basic amine in each of the following structures:



1. (4 points) One of the chemicals responsible for the unpleasant odor of fish is trimethyl amine. Why does adding vinegar (acetic acid) or lemon juice reduce this odor? Your answer should be in the form of a chemical reaction and a brief written explanation.



1. (2 points) Rank the following compounds in order of increasing boiling point (number 1-3 = lowest to highest)



1. (8 points) D-Psicose differs from D-fructose only at carbon 3.

a) Draw the Fischer projection and Haworth projection for the ß-anomer of D-Psicose.

1. Properly Name the ß-anomer of D-Psicose.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. (8 points) Answer the following questions regarding the following disaccharides that are labeled **A**, **B** and **C**.



a) What type of glycosidic bond is present in carbohydrate **A**?\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) What type of gylcosidic bond is present in compound **B**?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Which of the above disaccharides are reducing sugars, explain?

1. (3 points) Spermacetti, a fragrant mixture of lipids, was used in cosmetics. A major component of this substance is a wax called cetyl palmitate formed from palmitic acid, (C18:0), and cetyl alcohol, CH3(CH2)15OH. Draw the structure of this wax
2. (9 points) Answer the questions below.
3. Circle all terms that apply to the structure below



aldose, ketose, furanose, pyranose, tetrose, pentose, hexose, deoxy

1. If the terminal **-CH2OH** of the structure above is oxidized to a carboxylic acid, the resulting structure is called a/an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . (enter **alditol**, **aldonic acid**, or **uronic acid** in the blank)
2. A carbohydrate that consists of thousands of monosaccharide units joined by glycosidic bonds would be categorized as a/an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. The carbon that is involved in hemiacetal formation of a carbohydrate is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carbon. (enter the correct term in the blank).
4. (6 points) How many moles of H2 would be necessary to completely hydrogenate the following, Give the product of the hydrogenation



What is the physical state of the organic reactant and product and determine which will have a higher melting point. Explain

1. (6 points) What is the general structure of a cell membrane? What type of lipid is the major component of most cell membranes? What structural features make this lipid ideal for this purpose?
2. (6 points) What are the products for the complete saponification of the structure below? (use structural or condensed formulas) (make sure to draw mannose)





1. (12 points) Identify all of the following molecules that fit each category.

At least one structure (often more) will be appropriate for each category.

It contains phosphate: \_\_\_\_\_\_\_\_\_

Is derived from cholesterol: \_\_\_\_\_\_\_\_\_\_\_

Considered a sphingolipid: \_\_\_\_\_\_\_\_\_\_\_\_



Considered a glycolipid \_\_\_\_\_\_\_\_\_\_\_\_\_

Considered a bile salt:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Considered a glycerophospholipid:\_\_\_\_\_\_\_\_\_\_





