Chemistry 116 Name Key

Martin Larter

Exam 2 Fall 2013

Page 1 (14 points)

Page 2 (28 points)

Page 3 (16 points)

Page 4 (22 points)

Page 5 (16 points)

Total (96 points)

Percent (100 %)

Grossmont College

Periodic Table

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 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) |  | |  |  |  |  |  |  |  |

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| 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. Which compound is a tertiary alcohol?
2. 2-methyl-1-propanol
3. 3-hexanol
4. 3-methyl-1-hexanol
5. 2-methyl-1-hexanol
6. **2-methyl-2-hexanol**
7. The reaction conditions which would result in formation of disulfides from thiols are
8. gentle heat
9. weak acidification
10. **mild oxidizing**
11. mild reducing
12. none of the above
13. Reaction of an ester with a strong base is called
14. **saponification**
15. hydrolysis
16. Fisher Esterification
17. both A and C
18. trans (or reverse) esterification
19. All of the following can be oxidized except
20. Aldehyde
21. 1° alcohol
22. 2° alcohol
23. **3° alcohol**
24. Not enough information to decide
25. The pleasant, characteristic odor of fruit flavorings is often associated with the presence of
    * 1. Carboxylic acids
      2. **Esters**
      3. Carboxylic acid salts
      4. Aldehydes
      5. Amines
26. Denatured alcohol refers to
    * 1. Any alcohol not produced by fermentation.
      2. Grain alcohol that is highly taxed.
      3. **Ethyl alcohol that has been treated with something to make it unfit to drink.**
      4. All of the above
      5. None of these.
27. When phenol dissolves in water, it functions as
28. **a weak acid**
29. a weak base
30. an oxidizing agent
31. a reducing agent
32. none of the above
33. (16 points) Provide a name for each of the following structures.

 

Name\_\_\_\_\_\_7-chloro-4-methyl-4-nonanol\_\_\_\_\_ Name\_phenyl-3,3-dimethylpentanoate\_\_\_

 

Name\_\_cis-2-tert-butyl-4-hexenoic acid\_ Name\_\_\_\_4-ethoxy-3-hexanone\_\_

1. (8 points) Draw the structure for each of the following names

2-hydroxy-N-isobutylpropanamide 3-ethyl-2-pentanethiol

 

1. (4 points) Circle the structures below that will give a positive Tollens test (more than one answer is possible):



1. (16 points) Draw the major organic starting material or product(s) for the following reactions















1. (14 points) Identify the functional groups (boxed) that correspond to the following letters.

A.\_\_\_\_\_\_acetal\_\_\_\_\_

B.\_\_\_\_\_\_hemiacetal \_\_\_\_

C.\_\_\_\_\_\_amide\_\_\_\_\_\_\_

D.\_\_\_\_\_ether \_\_\_\_\_\_\_\_\_

E.\_\_\_\_\_thiol \_\_\_\_\_\_\_\_\_

F.\_\_\_\_\_ester \_\_\_\_\_\_\_\_\_\_

G.\_\_\_\_\_\_ketone \_\_\_\_\_\_\_\_\_



1. (8 points) Advil Structure below:



1. Explain why Advil is not water soluble include all relevant Intermolecular forces in explanation (label molecule showing soluble and not soluble area)

Advil structure contains a large non-polar entity, which makes the structure mostly insoluble in water because water is polar. It is readily soluble in organic solvents because organic solvents are mostly non-polar. This is described as the "like-dissolves-like" rule. The hydrogen bonding generated by the carboxylic acid cannot overcome the large nonpolar grouping on the molecule.

1. Explain why by adding sodium hydroxide to Advil the molecule becomes more water soluble

Advil is a carboxylic acid. It will react with the NaOH to for the sodium salt of the carboxylic acid. The salt is typically soluble in water. The formation of the salt makes the molecule more polar, larger charges, which will help to overcome the resistance to water generated by the large nonpolar region. Water is very polar, by increasing the polarity of the molecule (Advil) you make it more water soluble (like dissolves like)

1. (4 points) Rank the following compounds in order of increasing acidity (1 being the least acidic and 4 being the most acidic).



\_\_\_2\_\_ \_\_3\_\_\_ \_\_1\_\_ \_\_\_4\_\_

1. (12 points) Rank the following compounds in terms of increasing boiling point (1 = lowest). 
2. Illustrate the intermolecular force for the highest boiling compound you listed above



1. Explain how branching changes the boiling point of the molecule

Straight chain is more stackable and has more surface area and stronger London dispersion forces to attract molecules than the branched compound. Branched compounds lack the ability to pack efficiently leading to weaker effective intermolecular forces