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) |

Chem 116 EXAM 2 Summer 2009

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_Instructor: Martin Larter

 Last First

 Page 2 (19 points)

 Page 3 (24 points)

 Page 4 (24 points)

 Page 5 (25 points)

 Page 6 (13 points)

 Extra Credit \_\_\_\_\_\_\_\_\_\_\_\_ (4 points)

 Total (105 points)

 Percent (100 %)

The following tables may be useful for some of the questions below

 

Extra Credit: Draw in chair form the disaccharide of lactose (galactose, glucose) (4 pts)



1. Label the **five functional groups** on this molecule including acetals, hemiacetals, ketals and hemiketals as well as primary, secondary and tertiary where appropriate. (5 pts)



1. Define “meso compound” using words and a structure. (4pts)

A meso molecule has stereocenter but also has a **plane of symmetry** so the molecule is achiral.



1. Shown below is the structure of prostaglandin (-)-PGE2 Mark each stereocenter in the following molecule with an asterisk (\*) ( 6 pts)



1. The total number of stereocenters in (-)-PGE2 is \_\_\_\_\_4\_\_\_\_\_\_
2. The total number of stereoisomers for this molecule is \_\_16\_\_\_\_
3. What does the (-) mean (define term) in this compound’s name?

Levorotatory: rotates a plane of polarized light counter clockwise

 (-) Refers to an optically active

1. Draw the structure for each of the following names (6 pts)

Potassium benzoate cis-4, 5-dimethyl-2-octendial cyclohexyl-β-D-galactopyranoside







1. For the following compounds (9 pts)

If there is no pairs of any of the following below write “none”.

List all pairs of enantiomers. \_\_\_A&C, B&D\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

List all pairs of diasteromers. \_\_\_A&B, A&D, B&C, C&D\_\_\_\_\_\_\_

List all pairs that are identical \_\_\_\_\_\_\_None\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. Name the following molecules (12 pts)



 Name phenyl 3-methyl Butanoate Name\_4-hydroxy-2-cyclohexenone \_\_\_





 Name\_\_2-isoprpyl-4- methyl pentanoic acid \_\_\_\_ Name\_\_\_4-cyclopropyl-3-ethoxy butanal \_\_\_\_\_

1. Complete the reactions drawn by filling in either the reactant or the products. If there is more than one product, draw only the **major product.** If there is no reaction write **NR** (16 pts)



1. Explain the term **mutarotation** and draw an example of this using D-Idose. Please name each structure. (8pts)

**Mutarotation** is the term given to the change in the specific rotation of a cyclic monosaccharide as it reaches an equilibrium between its α and β forms.



1. The structure of raffinose, a trisaccharide found in some plants, is shown below



1. Write the **fisher structure** of the monosaccharides resulting from the acid hydrolysis of raffinose and **name** each (9 pts)



1. Point an arrow to each glycosidic bond and identify its type (example β1,4) (4 pts)
2. Is raffinose a reducing sugar? Why (3 pts)

No, this trisacharide does not contain any hemiacetals or hemiketals so all the rings are lock in position. These rings cannot unwind to the open chain that contains a aldehyde.and thus can not be oxidized

1. Below each of the following structures, write **all** of the appropriate terms from the list: triose, tetrose, pentose, hexose, heptose aldose, ketose, pyranose, furanose, “α”, “β”, deoxy, alditol, aldonic acid, uronic acid, D,L (9 pts)



1. Acetic acid has the higher boiling point. Although both can hydrogen bond with themselves, acetic acid is more polar, has more H-bonding positions, and it also forms dimers, giving it effectively double the mass.



1. Explain from a structural prospective why amylose turns blue black when exposed to potassium iodide but dextrin remains brown (define any terms necessary to explain this concept, assume the person you are talking to does not have much chemistry knowledge)? (4 pts)

Amylose is a linear polysaccharide of glucose that due to its size forms a helix. The potassium iodide interacts with this helix to generate the blue black color.

Dextrin is a linear oligosaccharide containing 3-10 glucose units. This structure is not large enough to form this helix thus the potassium iodide has not place to interacts and thus stays brown.

1. Determine the acidity of the following molecules (6 pts)

 a)



1. Rank the following molecules in terms of solubility in water explain your reasoning (6 pts)



 Explain

Solublity deals with molecules that are similar to water in terms of polarity. Compounds A and D have 2 H-bonding accepting groups that water can attach, but A is shorter chain thus less non-polar material which will make it easier to pull into solution. Compound C can accept one hydrogen bond from water making it more soluble then the thiol group who can have only dipole-dipole actions with water.

1. Definitions (5 pts)
2. \_stereoisomers\_ are molecules whose atomic connectivity is the same but whose atomic arrangement in space is different.
3. A compound is said to be \_\_\_optically active\_\_\_\_\_\_\_ if it rotates the plane of polarized light.
4. A disaccharide contains two monosaccharide units joined by a \_\_\_\_glycosidic bond\_ \_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_anomers\_\_\_\_\_ a pair of cyclic stereoisomers of a sugar or glycoside, differing only in configuration at the hemiacetal or hemiketal
6. \_\_\_\_\_cellulose\_\_\_\_polysaccharide of glucose that is connected beta 1,4