**Chemistry 104**

## Test #3C

**November 11, 2009**

***Please follow these instructions***

1. **There is only 1 correct answer for Multiple-choice questions (choose the best answer)**
2. **Please remember that only the answer sheets will be graded so record all your answers on the answer-sheet**

**3. Use the Periodic Table attached**

# November 11, 2009 Test 3C Chemistry 104

**Student’s Name:**

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|  **Answer** | **Answer** | **Answer** |
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# Test # 3 Chemistry 104 Fall 2009

**Dr Pierre Goueth Student’s Name:**

**Multiple Choice Questions (1.5 pts each)**

*Identify the choice that best completes the statement or answers the question.*

1. The glycolipid molecule is characterized by having a specific residue attached to the backbone. Which is that residue?
2. phosphate b) sugar c) lipid d) glycerol

1. The steroid that is the raw material for the production of other steroids is
2. cholesterol. b) triglyceride.     c) eicosanoid. d) progesterone.
3. The lipid hormones that are derived from arachidonic acid are the
4. sex hormones. b) adrenocorticoid hormones. c) eicosanoids. d) arachidonics.
5. If you were injured and wished to block a pain causing agent, which might it be?
6. prostaglandins b) leukotrienes     c) adrenocorticoids d) anabolic steroids
7. The thromboxanes are
8. adrenocroticoids that aid in the activation of sex hormones.
9. anabolics that may be involved in increasing blood pressure.
10. lipids that have the capacity to cause membranes to grow.
11. eicosanoids that are involved in blood clotting.
12. What is the function of the nonsteroidal anti-inflammatory drugs (NSAID)?
13. to facilitate the production of cyclooxygenase
14. to stimulate the production of leukotrienes
15. to interrupt the production of prostaglandins from arachidonic acid
16. to interfere with the production of anabolic steroids
17. The hydrogen sulfide ion, HS‾, can react differently depending on the acidity of the solution.

HS‾ + H3O+ H2S + H2O
HS‾ + H2O S2- + H3O+

1. The hydrogen sulfide ion is a base. c) The hydrogen sulfide ion is an acid.
2. The hydrogen sulfide ion is amphoteric. d) The hydrogen sulfide ion can only react with water.
3. An equilibrium is a reaction that
4. occurs very quickly using up all the reactants. c) produces the same amount of product as reactant.
5. has no products. d) goes to the right and left at the same rate.
6. The *K*eq for this reaction is calculated using what mathematical equation?

HS‾ (aq) + H3O+ (aq) H2S (aq) + H2O (*l*)

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| a) | http://www.webassign.net/raychem/tb9-08c.gif | c) | http://www.webassign.net/raychem/tb9-08d.gif |
| b) | http://www.webassign.net/raychem/tb9-08b.gif | d) | http://www.webassign.net/raychem/tb9-08a.gif |

1. An equilibrium is established
2. whether we start with the products or the reactants.
3. if the reaction initiates with the substances on the left of the reaction.
4. All of these choices are correct.
5. when all of the reactants are gone and only the products are present.
6. The amount of product derived from an aqueous equilibrium reaction depends on
7. it is the same under all reaction conditions.
8. the atmospheric pressure above the surface of the solution.
9. the temperature at which the reaction is performed.
10. whether the reaction starts with the substances on the right or on the left.
11. Choose the equilibrium constant that indicates there is the most reactant present when the reaction reaches equilibrium. (Each of the reactions has the form of A B.)
12. 1.1 10-7 b) 6.7 102 c) 8.3 10-2 d) 2.3 107
13. The effect of a catalyst on an equilibrium is
14. to speed up the reaction equally in both directions.
15. to shift the reaction in the direction of the catalyst.
16. to speed up the reaction to the left.
17. to speed up the reaction to the right.

14. What type of chemical reaction is the following?

 **Cu(s) + 2 AgNO3 (aq) → 2 Ag (s) + Cu (NO3)2 (aq)**

1. Double replacement b. Single Replacement c. Combination d. Decomposition

15. Water is likely to be a poor solvent for which types of molecules?

|  |  |
| --- | --- |
| a. | molecules which can form hydrogen bonds |
| b. | nonpolar molecules |
| c. | polar molecules |
| d. | none, water is considered a universal solvent |

16. What is the weight of glycine in a 400 g sample of a solution which is 2.5%(w/w)?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 1.0 g | b. | 2.5 g | c. | 10 g | d. | 25 g |

17. The label on a 750 mL bottle of wine states that its alcohol content is 12%(v/v). How much alcohol is present in the bottle?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 9 mL | b. | 90 mL | c. | 120 mL | d. | 180 mL |

18. A solution is prepared by dissolving 4.40 g of KSCN in enough water to make 340 mL of solution. What is the concentration of the solution?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 0.0440 *M* | b. | 0.0543 *M* | c. | 0.129 *M* | d. | 0.133 *M* |

19. Which of the following is true of methanol, CH3OH, when it dissolves in water?

|  |  |
| --- | --- |
| a. | it dissociates into ions |
| b. | it forms covalent bonds with water |
| c. | it forms hydrogen bonds with water |
| d. | none of the above, methanol does not dissolve in water |

20. A catalyst speeds up a chemical reaction as a result of which of the following?

|  |  |
| --- | --- |
| a. | it increases the number of collisions between reacting molecules |
| b. | it makes the reaction more endothermic |
| c. | it makes the reaction more exothermic |
| d. | none of the above |

21. For the reaction PCl3*(g) +* Cl2*(g)*  PCl5*(g)* which of the following is true once the reaction has reached equilibrium?

|  |  |
| --- | --- |
| a. | the concentration of PCl3 remains constant |
| b. | the concentrations of PCl3 and Cl2 are always equal |
| c. | both (a) and (b) are true |
| d. | neither (a) nor (b) is true |

22. Which of the following could be the equilibrium constant for a reaction which does not yield a significant concentration of products?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 1 x 10 -15 | b. | 1 x 10 -2 | c. | 1 x 102 | d. | 1 x 1015 |

23. Which of the following is the Brønsted-Lowry definition of a base?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | a hydroxide ion acceptor | c. | a proton donor |
| b. | a proton acceptor | d. | none of these |

24. Which of the following is the conjugate acid of HPO42⁻?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | H3PO4 | b. | H2PO4⁻ | c. | PO43⁻ | d. | H3O+ |

25. Which of the following is used to define lipids?

|  |  |
| --- | --- |
| a. | the presence of a specific functional group |
| b. | their chemical structure |
| c. | their insolubility in water |
| d. | none of these |

26. Which alcohol is a component of all triglycerides?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 1,2,3-butanetriol | b. | ethylene glycol | c. | glycerol | d. | none of these |

27. Which of the following is true of most fatty acids found in triglycerides?

|  |  |
| --- | --- |
| a. | they are unbranched |
| b. | they contain more than 20 carbon atoms |
| c. | they contain an odd number of carbon atoms |
| d. | none of the above |

28. Waxes belong to which class of compounds?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | alcohols | b. | carboxylic acids | c. | esters | d. | ethers |

29. Which of the following is a reactant in a saponification reaction?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | a strong acid | b. | a weak acid | c. | a strong base | d. | a weak base |

30. Which of the following is a function of unsaturated fatty acids in membranes?

|  |  |
| --- | --- |
| a. | they give the interior of the membrane liquid like structure |
| b. | they provide a site for chemical reactions to occur |
| c. | both (a) and (b) |
| d. | neither (a) nor (b) |

31. Which of the following structural arrangements is the steroid structure?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

32. The equation below is properly balanced when

 **wPCl5 + xH2O → yPOCl3 + zHCl**

a. *w* = 1, *x* = 2, *y* = 2, *z* = 4 b. *w* = 2, *x* = 2, *y* = 2, *z* = 2 c. *w* = 2, *x* = 2, *y* = 2, *z* = 1 d. *w* = 1, *x* = 1, *y* = 1, *z* = 2

33. For the reaction 2N2*(g)* + 3H2*(g)*  2NH3*(g)* which of the following can be determined using only the coefficients of the balanced chemical equation?

a. how many molecules of NH3 are obtained if 4.2 moles of N2 react completely to form NH3

b. how many moles of NH3 are obtained if 4.2 moles of N2 react completely to form NH3

c. both (a) and (b) d. neither (a) nor (b)

34. A tea bag is placed into a cup of hot water. The resulting beverage is most likely a \_\_\_\_.

 a. solution b. suspension c. colloid d. solvent

35. When red blood cells are placed into deionized water they will undergo \_\_\_\_\_ since deionized water is \_\_\_\_\_.

 a. crenation/hypotonic b. crenation/hypertonic

 c. hemolysis/hypotonic d. hemolysis/hypertonic

1. Which reaction is NOT an oxidation-reduction reaction?
2. AgNO3(*aq*) + NaCl(*aq*) NaNO3(*aq*) + AgCl(*s*) c) 2 Ag(*s*) + S(*s*) Ag2S(*s*)
3. 2 Na(*s*) + 2 H2O(*l*) 2 NaOH(*aq*) + H2(*g*) d) All of these are oxidation-reduction reactions.
4. An indicator that an atom has become reduced is
5. The atom becomes attached to a carbon. c) There is no concrete indicator.
6. The atom gains an oxygen. d) The atom gains a hydrogen.
7. Hydrolysis
8. is the result of removing water from between two compounds.
9. is a system by which the body remains hydrated.
10. is a chemical reaction that can split molecules.
11. is a class of reactions that occurs without the use of enzymes.
12. If ethene (H2C=CH2) were to react with water in an acid solution (H+ present), the result would be

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| a) | http://www.webassign.net/raychem/tb6-20c.gif | b) | http://www.webassign.net/raychem/tb6-20a.gif |
| c) | http://www.webassign.net/raychem/tb6-20d.gif | d) | http://www.webassign.net/raychem/tb6-20b.gif |

1. If there is a limiting reactant in the hypothetical reaction, A + B C, it is the substance
2. on the left that is used to produce substance C on the right.
3. on the left that is limited by the amount of C produced.
4. on the left that is used up first.
5. on the right that is produced in a limited amount.
6. Which of the factors will increase the rate of a reaction?
7. decreasing reactant concentrations c) increasing the temperature
c) decreasing one of the reactant concentrations d) increasing activation energy
8. The relationship of temperature to solubility generally is
9. solids dissolve better in cooler liquid solvents than in warmer solvents.
10. liquids dissolve better in solids at lower temperatures.
11. gases dissolve better in cooler liquid solvents than in warmer solvents.
12. All of these statements are correct.
13. William Henry studied the solubility of gases in water. Henry's law states that
14. gases dissolve better in water if the gas-water mixture is shaken.
15. gases dissolve better in warm water than in cold water.
16. gases dissolve in liquids proportionally to the pressure of the gas over the liquid.
17. gases dissolve better if there is a salt dissolved in the water first.

1. A compound is likely to be hydrophilic if
2. there are many carbons in the skeleton of the molecule.
3. all of the chemical bonds are covalent.
4. it contains polar groups.
5. the compound forms strong London force interactions between molecules.
6. Soaps are amphipathic compounds.
7. Soaps cannot be attracted to either polar or nonpolar compounds.
8. Soaps dissolve best in polar solvents, which is why they can remove dirt.
9. Soaps have a hydrophobic end which will attract nonpolar substances, such as soil on clothing.
10. The soaps that are the most effective in cleaning contain the calcium ion.
11. A bottle of 6 *M* NaOH is on the lab bench. You are instructed to make 75 mL of 0.5 *M* NaOH. How much 6 *M* NaOH do you have to obtain to dilute to the requirements?
12. 37.5 mL b) 6.25 mL c)9.0 mL d) None of these
13. Which of these contains the largest particles?
14. suspension b) solvent c) solution d) colloid
15. If red blood cells were to be stored in a hypertonic solution in the blood bank, then
16. there would be too much water present to store red blood cells effectively.
17. the water would flow out of the cells resulting in shrinkage and wrinkling.
18. there would be no problems as this matches the red blood cell's composition.
19. the cells would tend to explode due to the movement of water into the cells.
20. Saturated fatty acids share which characteristic?
21. a polar tail, which explains how the molecules interact
22. solid at room temperature, can be melted with little heat
23. double bonds between carbons; trans linked carbons
24. solid at room temperature, high melting points
25. Fatty acids can produce ions that are
26. amphipathic. b) highly charged at the tail. c) nonpolar. d) hydrophobic.
27. Waxes are compounds that are
28. the result of the reaction of a fatty acid and sodium hydroxide.
29. the result of fatty acids combining with long chain alcohols.
30. extremely hydrophilic due to the head end of the compound.
31. small compounds produced when short chain fatty acids react with an alcohol.
32. The effect of the hydrogenation of oils is to
33. cause the oils to remain as liquids. c) to make the oils oxidize.
34. to make the oils boil at a lower temperature. d) remove double bonds.
35. Saponification
36. is a reaction found in plant metabolism. c) results in the production of triglycerides.
37. is a hydrolysis reaction. d) is used to store energy for later use.
38. Phospholipids
39. contain a sugar, which may be simple or a chain. c) are part of the structure of cell membranes.
40. are part of the structure of cell membranes. d) are very polar on both ends.

1. The difference between the sphingolipids and the glycerophospholipids is that the sphingolipids
2. have three alcohol residues that replace the fatty acid residues.
3. include sphingosine with a phosphate attached to it, and an alcohol residue.
4. have one phosphate, but it is attached to the fatty acid residue, not the glycerol.
5. have three phosphates, not one, and they are attached to all of the fatty acids.

# Short answers (2.5 pts each) Show your work for full credit

1) Calculate the percent by mass, %(m/m), of a salt solution prepared by dissolving 75.0 g of NaCl in 125 g of water?

2. In an aqueous solution the [H+] is 2.0 x 10-6 *M*. What is the [OH-]?

3. A solution has [OH-] of 1.2 x 10-2. What is the [H3O+] of the solution?

4. What is the weight of NaCl in a 0.500 L bottle of 2.00 *M* NaCl?

