CHEMISTRY 209

Final Exam

60 MINUTES
January 21, 2000

Family Name:

First Name:

ID #:

Section:

Question 1 [21 pts]

Complete each of the following statements:

I. The reaction of methyl phenyl ketone with Br_2/NaOH to give benzoic acid is known as the _____reaction.

II. Chemical reactions can be monitored for completion by_____

III. An example of a strong mineral acid is _____

IV. A disaccharide is composed of two_____units.

V. mono-, di- and oligosaccharides are the compounds known as _____

VI. Chromatography is based on differences between compounds in their partitioning between a stationary_____ and a _____

VII. The two most common adsorbents for TLC are silica gel and _____

VIII. An example of a drying agent used in Chem 209 is _____

IX. A reflux apparatus is composed of a _____ and a _____

X. Treating _____with zinc dust in acetic acid regenerate cholesterol in pure form.

XI. The formula of iodoform is_____

XII. The yellow (orange) color due to the presence of an excess of bromine is removed by the addition of _____.

Question 2 [19 pts]

Aspirin can be made by treating salicylic acid with acetic anhydride according to the procedure described in the laboratory manual for chemistry 209. Assume the experiment calls for 10 grams of salicylic acid and 20 ml of acetic anhydride:

I. Write a balanced equation for the reaction.

II. Calculate the number of moles of salicylic acid and of acetic anhydride (density 1.08 g/ml) that will be put into the flask.

III. Which of these substances will determine the maximum amount of product that will be produced? That is, which substance is the limiting reagent?

IV. What is the maximum amount (moles and grams) of aspirin that could be formed in the experiment?

V. How do you account for the smell of vinegar when an old bottle of aspirin is opened?

Use C = 12.0; O = 16.0; H = 1.0

Question 3 [12 pts]

Tick the correct answer(s)
Marks will be deducted for ticking an incorrect answer.

1. Which of the following matches the definition of aldopentose?

A is a monosaccharide
B is a disaccharide
C contains a –CHO group
D is a nonreducing sugar
E contains a –CO– group.

2. Which of the following compounds gives the haloform reaction?

A C_6H_5-CH(OH)-C_6H_5
B C_6H_5-CH(OH)-CH_3
C C_6H_5-CO-Cl_3
D CH_3-CH_2-OH
E CH_3-CH_2-CO-CH_2-CH_3

Question 4 [12pts]

(a) Which test do you regard as the most reliable for distinguishing reducing from non reducing sugar. Write a complete general chemical equation to represent this test.

(b) Give one example of each of the following: a reducing monosaccharide, a reducing disaccharide, and a non-reducing dissacharide.

(c) A sugar has reducing properties because of the presence of specific functional groups in its structure. What are these functional groups?

Question 5 [12pts]

(a) Suggest two methods for locating (visualizing) the spots on a TLC plate particulary, when the solute is colorless.

(b) Give the formula used for calculating R_f values.

(c) The R_f values for 2 substances A and B were determined by two students. The results were:
Student 1: 1.41 and 1.58
Student 2: 0.71 and 0.63
In your opinion, who has the right values and why?

Question 6[12 pts]

(a) Write a complete chemical equation to represent the synthesis of isoamyl acetate.

(b) Suggests two ways to push the reaction to the right.

(c) What is the purpose of adding sulfuric acid to the reaction? Does this affect the position of the equilibrium. Explain.

(d) What is the purpose of using sodium carbonate. Write the chemical equation of the reaction taking place.

Question 7[12 pts]

Write a chemical equation to represent the reaction taking place in each of the following:

(a) Regeneration of benzoic acid from sodium benzoate.

(b) Preparation of salicylic acid from sodium phenoxide.

(c) Oxidation of toluene with chlorine.

(d) Acetone reacting with Br_2/NaOH.