Department of Chemistry

University of Missouri-St. Louis

Name _____ Exam II

May 4, 2020 Chem. 2633

Some useful information is available at the end of the exam. **Delete the incorrect statements.**

1.A. (30pts) An advantage of using vacuum distillation to distill a high boiling liquids includes:

1) boiling occurs at a lower temperature. 3pt each

4) can prevent decomposition 3 pts each

1B. Do you think that you could vacuum distill a low melting solid with a moderately high boiling temperature?

1) yes

1C. Advantages of using steam distillation to distill an organic liquid are.

Steam distillation: 1) separates volatile from nonvolatile compounds 3pt each

4) avoids high temperatures 3pt each

1D. Do you think that you could steam distill a volatile solid?

1) yes

1E In the reduction of benzyl to 1,2-diphenylethane-1,2-diol, following the reduction with sodium borohydride, the reaction is heated in water

2) to hydrolyze the borate ester and excess borohydride

2. (20pts) A student started off with 6 grams of benzaldehyde (mw 106 and isolated 3 g of benzoin (mw 212).

2A. The yield in the first step was:

1) 50%

2B. In the second step, 3 g of benzoin was oxidized with excess HNO_3 to benzil (mw 210). A recovery of 2.0 g of benzil was realized. What was the yield in this step?

a. 67.3 %

2C. In the third step of the synthesis, 2 g of benzil (mw 210)was condensed with 2 g of diphenylacetone in base. If 3.0 g of tetraphenylcyclopentadienone (mw 384) was isolated, what was the yield?

1) 82%

2D What is the overall % yield in the synthesis of of tetraphenylcyclopentadienone starting from benzaldehyde ?

2) 27.6 %

3. (10 pts) A student's natural product had two peaks in the gas chromatograph, one at 1.1 min (CH_2Cl_2) and another at 3.4 min (natural product). The standards in CH_2Cl_2 had the following retention times:

natural product: 3.4 – 1.1 = 2.3 min

caraway	1.2 min	3.7 min	3.7 – 1.2 = 2.5 min
allspice:	1.3 min	3.6 min	3.6 – 1.3 = 2.3 min
cumin:	1.1 min	3.2 min	3.2 – 1.1 = 2.1 min

The student's spice was 2) allspice

4. (10pts) The following plots are typical composition (y) vs fraction number (x) for simple and fractional distillation of cyclohexane and methylcylohexane.

A Of the two lines in each plot, which line represents cyclohexane

a) blue line

B. Which plot describes fractional distillation

b) left plot

5. Problem 5 was not graded because the answer became apparent on some exams.

Excluding this problem made the exam worth 100 pts.

6. (10 pts) A student's liquid unknown is one of the following. Based on the compounds physical properties, possibilities include: Use the spectra and each compounds composition to arrive at your answer

Based on the spectra given below what is the student's unknown? compound **1**

7. (20 pts) The following IR spectra represent compounds similar to what you used or made this semester. They include pentyl acetate, p-aminophenol, methyl p-hydroxybenzoate and p-acetoxybenzoic acid.

1.	The compound is	2)	p-aminophenol
2.	The compound is	1)	pentyl acetate,
3.	The compound is	3)	methyl p-hydroxybenzoate
4.	The compound is	4)	p-acetoxybenzoic acid