EXAM 3

CHEMISTRY 225b

Friday, April 25, 2008

NAME (print): _____

TA:_____ Day:_____ Time:_____

Take a few moments to look over the exam. Answer each question on the exam paper.

Important clues, points, and structures are in **bold**.

Do all **preliminary** drawing or computations on the work sheets at the end of the exam. The work sheets will not be graded

The exam is 55 minutes.

STOP writing and hand in your exam when you are asked to do so.

REMEMBER: Neatness is to your advantage.

1. (30 pts) Reactions _____

2. (30 pts) Potpourri _____

3. (20 pts) Synthesis _____

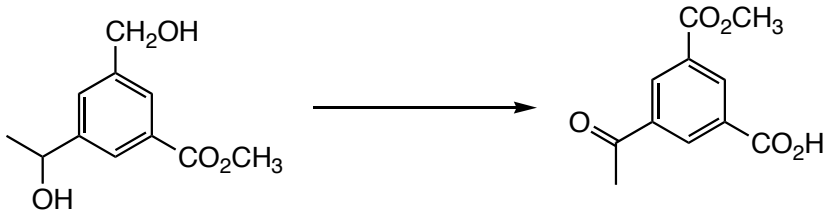
4. (20 pts) Structure _____

_____

Total (100 pts)

Name:_____

1. (30 pts) **Reactions:** Provide answers to the following reactions.

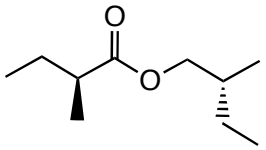
a) 

b) 3-heptyne $\xrightarrow[\text{aq. } H_2SO_4]{HgSO_4}$ **A** + **B**

c) 3-hexyne ⟶ meso-3,4-hexanediol

d) (not the same route as 2c)

3-hexyne ⟶ meso-3,4-hexanediol

e)  $\xrightarrow[\text{ether}]{LiAlH_4}$ **A**

opt. act.

2. (30 pts.) **Potpourri:** Complete each of the following questions.

a) Stable solutions of the lithium salt of 1-octyne can be prepared in which of the following solvents (**Circle** your answer(s)).

(*E*)-3-hexene H_2O acetone NH_3 $(CH_3)_3COH$

b) Lindlar reduction of 2-pentyne liberates 37.4 kcal/mol of heat. Hydrogenation of (*E*)-2-pentene liberates 27.4 kcal/mol of heat to form n-pentane (ΔH_f^o=-35.1 kcal/mol). **Circle** your **best estimate** for the heat of formation of 2-pentyne (kcal/mol)? (What do you know about the ΔH_f^o of (*E*)- and (*Z*)-disubstituted alkenes?)

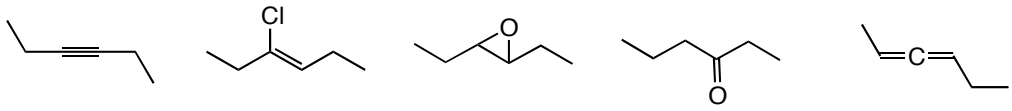
-29.7 -30.7 +29.7 +30.7 -7.7

c) **Circle** the halide(s) that will form viable Grignard reagents.

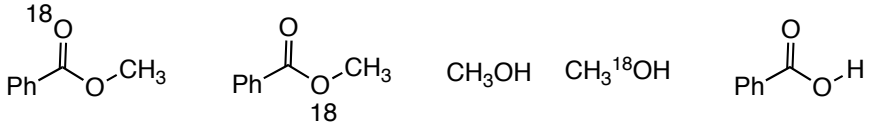
$BrCH_2CH_2Br$ $HOCH_2CH_2CH_2Br$ $CH_3CH_2OCH_2CH_2CH_2Cl$

$BrCH_2CH_2CHO$ $BrCH_2CH_2CO_2H$

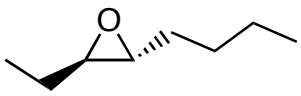
d) **Circle** the greatest number of compounds that are at the same oxidation level.



e) **Circle** the products expected to be formed during the hydrolysis of methyl benzoate with $H_3{}^{18}O^+$.



3. (20 pts) **Synthesis:** Design a synthesis of (±)-epoxide **1** using 2-butyne as your only source of carbon. All other reagents are available to you. [Hint: You did most of this problem on your homework.]



1

4. (20 pts). **Structure:** Optically-active alkyne **A**, $C_{10}H_{18}$, undergoes reduction to form compound **B** ($C_{10}H_{20}$). Compounds **A** or **B** form a **single** (*S*)-carboxylic acid ($C_5H_{10}O_2$) **C** upon oxidation with aqueous $KMnO_4$. [At this point you should know the structures of **A** and **C** and some of **B**]. Compound **B** also reacts with bromine to form **two** (and not one) optically active dibromides **D** and **E** (**D** and **E** are not distinguishable). What are the structures of **A-E**? Show how **D** and **E** determine the stereochemical issue in **B**. How was **A** reduced to **B**?

Name:_____

Work Sheets

Name:_____

Work Sheets

Name:_____

Work Sheets