EXAM 4

CHEMISTRY 220a

Friday, December 7, 2001

NAME (print): _____

TA:_____ Section Day:_____ Section Time:_____

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

Important clues and instructions 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. There is a Periodic Table on the last page of the exam.

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. (25 pts) _____

2. (25 pts) _____

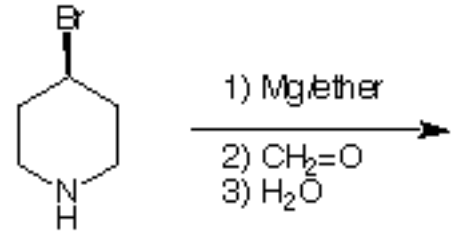
3. (25 pts) _____

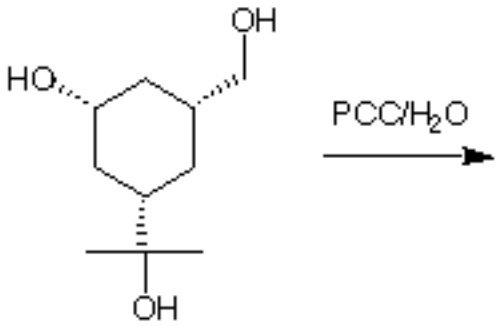
4. (25 pts) _____

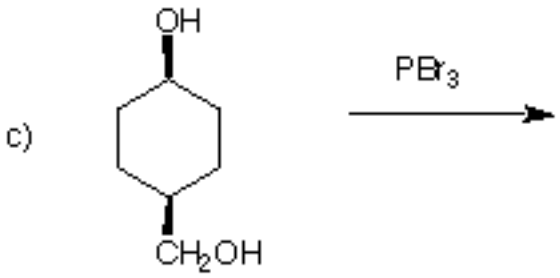
_____

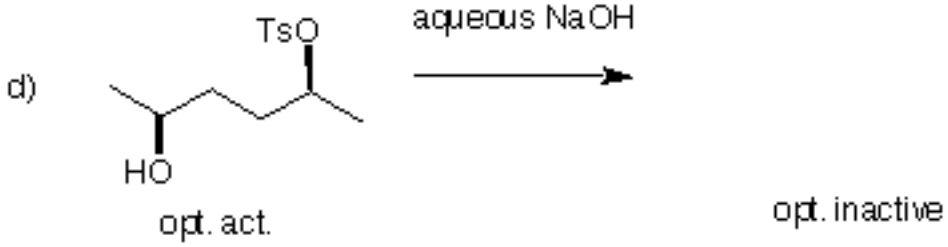
Total (100 pts)

1. (5 x 5 pts. = 25 pts.) Provide the **products** in each of the following chemical reactions. Pay attention to stereochemistry.

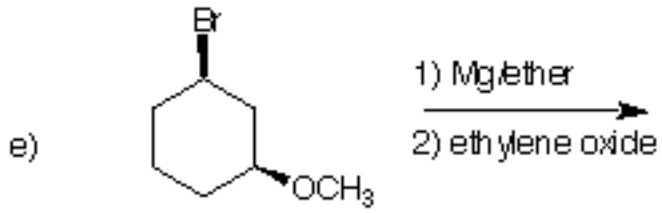
a) 

b) 

c) 

d) 

opt. act. opt. inactive

e) 

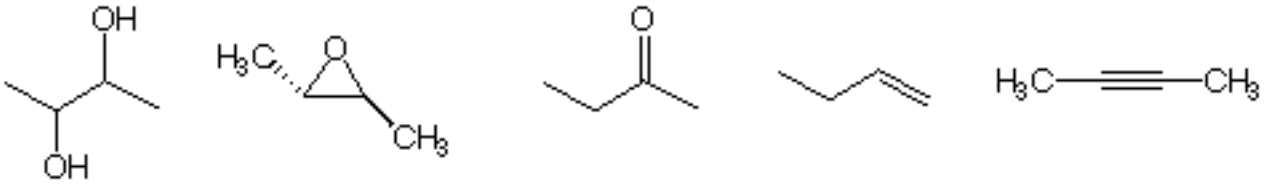
two diastereomers

2. (5 x 5 pts. = 25 pts.) Circle the **best answe**r in each of the following:

a) The molar ratio of CrO_3 to RCH_2OH required in the complete oxidation of a primary alcohol to a carboxylic acid.

2/3	1/6	1/1	3/2	4/3

b) The compound(s) with the highest oxidation level



c) The operational equivalent of the reaction of an olefin with O_3 followed by $(CH_3)_2S$:

$KMnO_4$ cold	$KMnO_4$ warm	$KMnO_4$/ cat. OsO_4	H_2O_2/cat. OsO_4	HIO_4/cat. OsO_4

d) If a 1N solution requires 49 g of H_2SO_4 per liter of aqueous solution, then a 1N solution of Jones's reagent (CrO_3/aq. H_2SO_4) requires how many grams of CrO_3 per liter of aqueous solution?

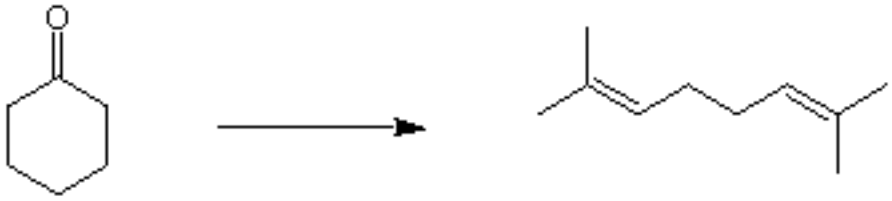
100	67	33	49	98

e) A chemical pathway leading from ethane to acetic acid involves a change of how many electrons?

-4	-2	+4	-6	+6

3. (25 pts.) Compound **A**, C_8H_{16}, reacts with OsO_4/H_2O_2 to give (±)-diol **B**. Compound **A** does NOT give n-octane upon catalytic hydrogenation. Monotosylation of **B** gives alcohol **C**, which when treated with KOH, gives meso compound **D**, $C_8H_{16}O$. Exposure of diol **B** to periodic acid (HIO_4) provides a single compound **E**, C_4H_8O. Compound **E** is inert toward pyridinium chlorochromate (PCC) in CH_2Cl_2. However, the addition of some water to the reaction mixture affords **F**, $C_4H_8O_2$. What are the structures **A** - **F**? Justify your answers.

4. (25 pts.) Show how you would convert cyclohexanone **1** into 2,7-dimethyl-2,6-octadiene **2**. The only other source of carbon available for the synthesis is methyl alcohol. All reagents and carbon-based solvents are available.



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