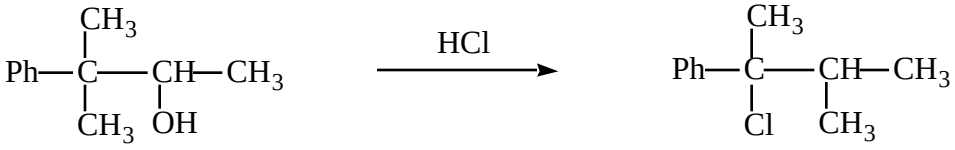
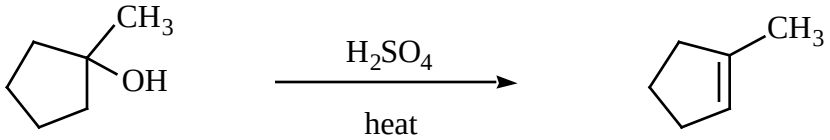
Chemistry 2521, Spring Semester 2001
Sample Final Exam
Chs 1-10 of Brown & Foote text

This exam has 6 problems (200 pts) on 5 pages. Make sure your copy is complete and correct.
Answer key is available in PDF format at: **www.d.umn.edu/~vzhdanki/2521/**

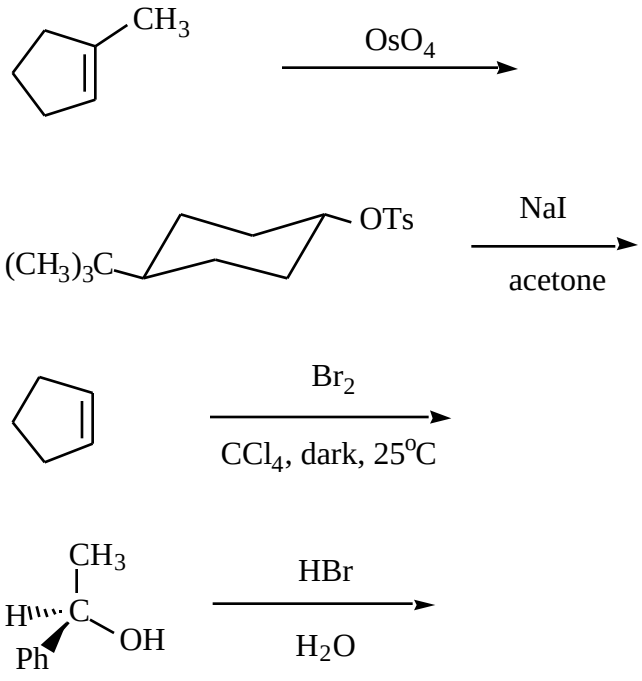
1. (30) Using **curved arrows** and showing the structure of the **intermediates**, write **mechanisms** that account for the products in the following reactions (15 pts each):

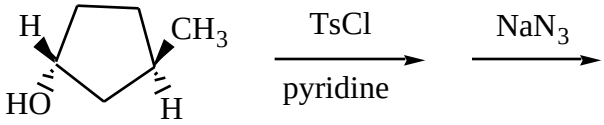
(a) 

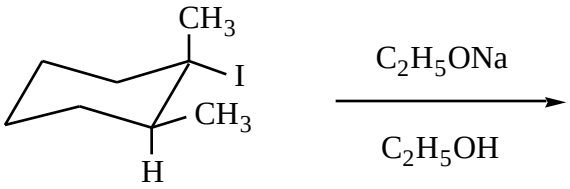
(b) 

2. (29) Draw **three-dimensional structures** of major organic products for the reaction of **(R)-3-methylcyclopentene** with $\mathbf{Br_2}$ in CCl_4 (10 pts). Assign **R,S configurations** for all chiral centers in each of the products. (8 pts). Using **curved arrows**, write a **mechanism** that explains stereochemistry of the reaction (11 pts).

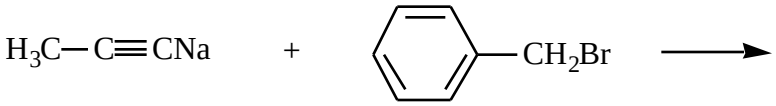
3. (36) Complete the following equations by drawing **three-dimensional structures** with **correct stereochemistry** of the major organic products expected in each case (6 pts each).

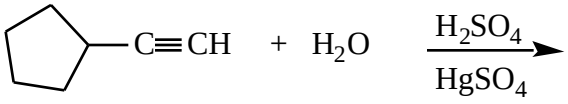


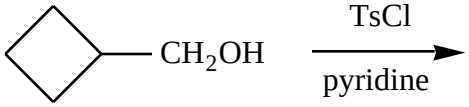


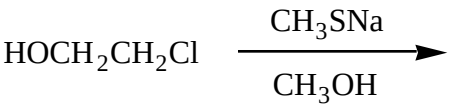


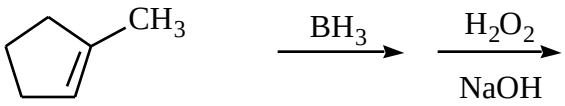
4. (35) Complete the following equations by drawing structures of the **major** product(s) expected in each reaction (5 pts each).

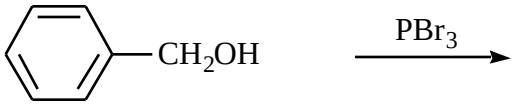


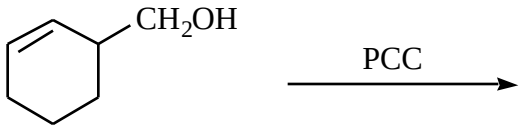




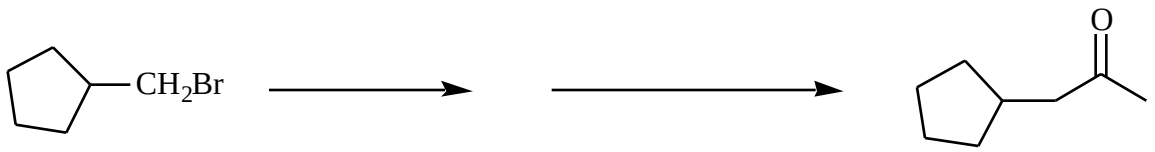


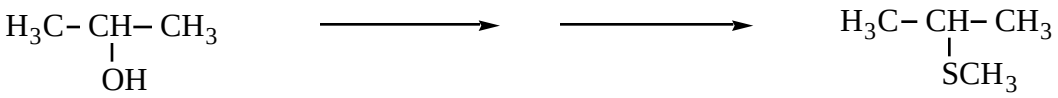


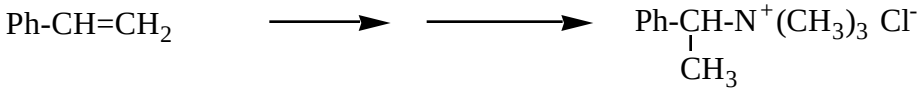


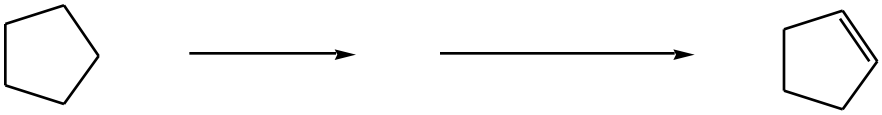


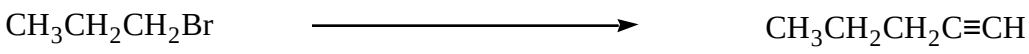
5. (30) Give the **reagents on the arrow** that can be used to convert the reactant to the indicated product in high yield (5 pts each).

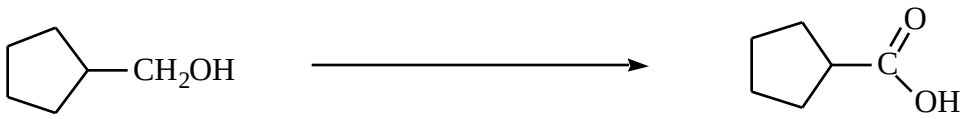










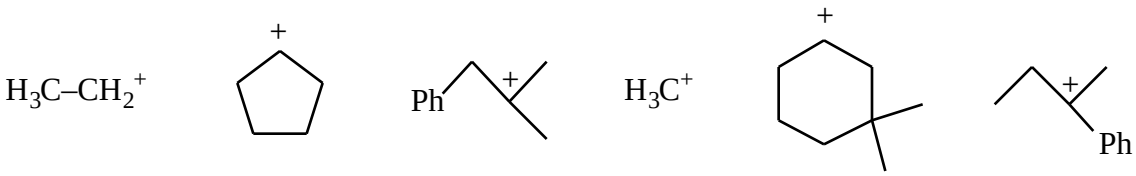


6. (40, 5 pts each) For each of the following questions (a)-(h) **circle** the item that is the correct answer.

(a) Which of the following compounds is the **most reactive in S_N2** reactions?

iodocyclohexane 1-iodo-2-methylhexane 1-iodo-1-methylcyclohexane
2-iodohexane 1-iodo-4-methylhexane 1-iodo-4-methylcyclohexane

(b) Which one of the following species is the **most stable carbocation**?



(c) Which of the following substituents is the **best leaving group**?

–OTs –Cl –CH_3 –Ph –OH –F –NH_2

(d) Which one of the following anions is the **strongest base**?

CH_3NH_2 $C_2H_5O^-$ $CH_3CH_2^-$ HO^- H_2O NH_2^- Br^- I^-

(e) Which one of the following compounds has **four** stereoisomers?

2-bromobutane 3,4-dichlorohexane methylcyclopentane 1,1-dimethylcyclobutane
1,4-dichlorocyclohexane 2,3-dibromopentane 1,2-dibromocyclohexane

(f) Which one of the following compounds will have the **highest** boiling point?

CH_3F C_2H_6 CH_3OCH_3

(g) Which one of the following compounds has the most **acidic C–H bonds**??

2-butyne 3-methyl-1-butene 1-buten-3-yne methane
2,3-dimethyl-2-pentene propene ethylene cyclohexene

(h) Which of the following compounds is the **most stable alkene**?

2-methyl-2-butene 3-methyl-1-butene 2-methyl-1-butene
2,3-dimethyl-2-pentene propene ethylene cyclohexene