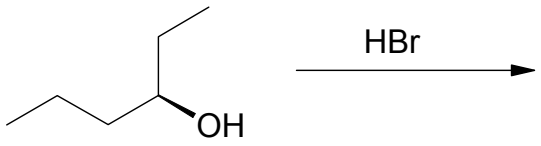
INTRODUCTORY ORGANIC CHEMISTRY II --- **PROBLEM SET #1**

DISTRIBUTED: Thurs.Oct.4th. COMPLETION DEADLINE: Thurs.Oct.18th @ 9am.

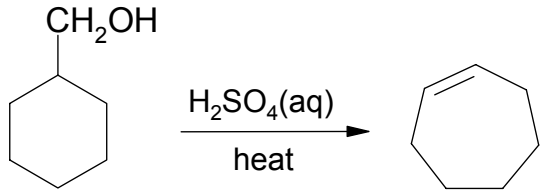
INSTRUCTIONS: Work through all problems thoroughly on paper, and discuss them with your classmates to reinforce your learning. Your **written answers will neither be handed in nor graded**, but to prepare for the midterm, you must practice clearly drawing structures and mechanisms and formulating logical explanations. Your understanding of these problems will be **evaluated using a quiz on the Moodle website**, which must be completed INDIVIDUALLY (be aware that having another person complete your quiz for you constitutes plagiarism, *i.e.,* fraud, for both parties involved). The quiz will be available from early next week until **9am Thurs. Oct.18th**. Before that time, you can change your answers as much as you like; after the deadline, your final answers will be graded and you will be able to see your score and feedback.

Problem #1 – For each reaction, provide a detailed "arrow-pushing" mechanism that explains how the product forms. For part **a**, you will first need to predict the major product (include stereochemistry).

a)

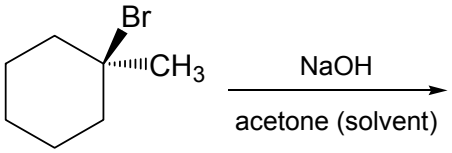


b)



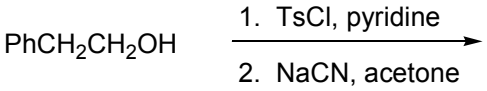
Problem #2 – Predict the major product for each reaction or reaction sequence. Also draw the structures of all stable intermediate species involved. Remember to consider stereochemistry.

a)

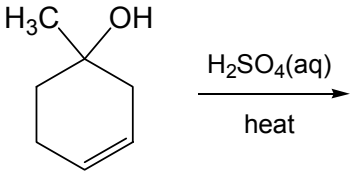


Would you expect the same products if you perform the reaction at 56°C (bp of acetone) versus at -15°C? Explain.

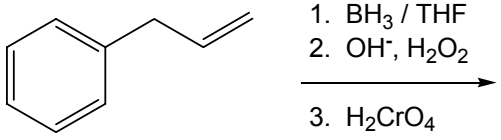
b)



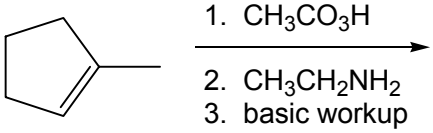
c)



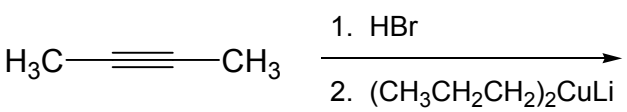
d)



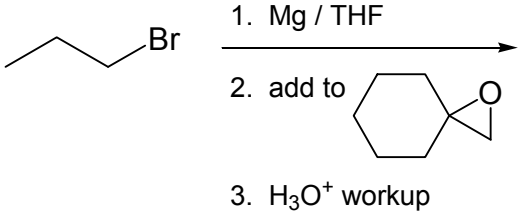
e)



f)

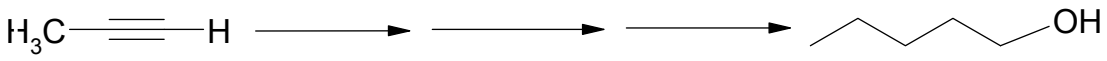


g)



Problem #3 – Provide a three-reaction sequence (*i.e.,* synthesis) that could be used to carry out the following transformation. Use reactions we have studied in class and reactions learned in Organic I where necessary. For each step in your synthesis, please specify:

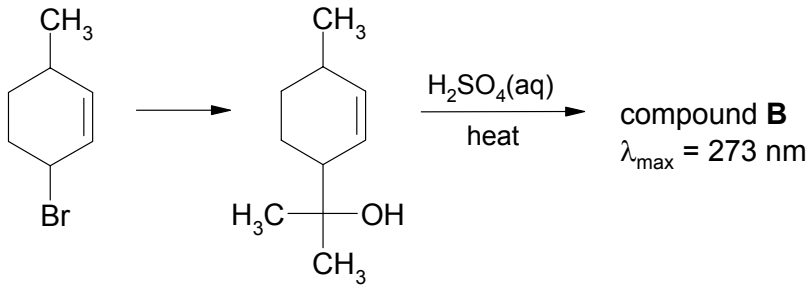
(i) reagent(s) needed
(ii) solvent, if the choice is important
(iii) temperature, if above/below room temperature
(iv) workup conditions, *e.g.,* acidic workup *vs.* basic workup



Problem #4 – A student converted 3-bromo-6-methylcyclohexene to alcohol ***A*** (using reactions we'll learn soon). She heated alcohol ***A*** with sulfuric acid and purified one of the components (compound **B**) from the resulting mixture.

a) The UV spectrum of compound **B** shows λ_{max} at 273 nm. Using elemental analysis, compound **B**'s empirical formula was determined to be C_5H_8, and the compound's mass spectrum showed a molecular ion at *m/z* 136. Propose a structure for compound **B**. Explain your choice.

b) Propose a mechanism for the conversion of alcohol ***A*** to compound **B**.



alcohol **A**

Problem #5 – Spectral data for isomeric compounds A and B are provided here and on the following two pages. Assign structures for both compounds, and explain your reasoning. Remember to refer to the detailed peak position summaries given in the textbook's Appendix.

	Compound *A*	**Compound B**
MS (selected peaks)	*m/z* = 148 (M, 7%), 106 (8%), 105 (100%)	not available
IR (neat, in KBr)	See attached spectrum	See attached spectrum
^{1}**H NMR** (in $CDCl_3$)	See attached spectrum	See attached spectrum