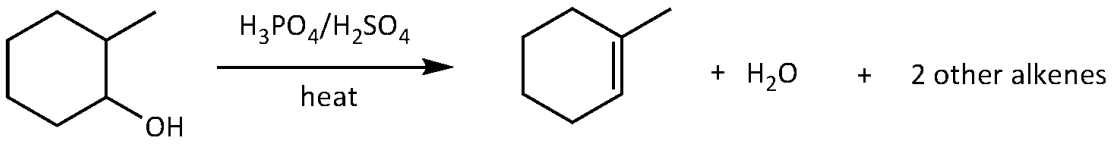
Dehydration of 2-methylcyclohexanol

Reading: Experiment 24A (microscale version) and unsaturation tests (p. 214) in Pavia (5th edition); review *Techniques* listed under **Required Reading.** See also Klein, secs. 7.12 and 12.9



Introduction

Heating an alcohol with acid results in the formation of alkenes along with the loss of water (hence, this is referred to as a dehydration reaction). **In our experiment, we will substitute 2-methylcyclohexanol for the 4-methylcyclohexanol prescribed in *Pavia***. Our substrate can potentially lead to three unique alkene products. The product(s) will be removed from the reaction mixture using continuous azeotropic distillation. The organic product will be separated from the water that co-distills with it, and then dried over anhydrous sodium sulfate. The product mixture will be analyzed by infrared spectroscopy, gas chromatography-mass spectrometry (GC-MS), and we will perform the unsaturation tests described in Pavia.

Prelab

Include the usual **Name**, **Date**, **Purpose**, and **Outline**. The **Chemical Equation** should depict **all three of the products** that can formed from 2-methylcyclohexanol. The prelab write-up must include a detailed **Reagent Table**. Be sure to calculate the total theoretical yield of the alkene products (note that all three products have the same MW). Additionally, you should find and list the boiling points for the three isomeric alkenes that can be formed. Include a sketch of the reaction apparatus as part of the **procedural summary**.

Procedure

The experiment is described in Pavia 24A—follow the procedure given except substitute **2-methylcyclohexanol** for the substrate. Our Hickman stills are equipped with the side ports. Will also perform the unsaturation tests described on page 214. **Carefully note the results of the unsaturation tests in your notebook.**

To Complete the Experiment – Formal Report (additional guidelines will be provided)

Be sure to print copies of the IR spectrum and the gas chromatogram.