

Chem 220a

Problem Set 5

Chapter 6

Due: Monday, October 11, 2004

1. Study #2 and #3 in the Alkyl Halide module and #1 in the Ether module in [ORGO](#).

2. Achiral compound **A** (C_8H_{14}) is inert toward hydrogen in the presence of a catalyst. Compound **A** can and does form two, and only two, monosubstitution products upon free radical chlorination. One of these products, **B**, is achiral while **C** is a racemate. Compound **B** is inert toward C_2H_5ONa/C_2H_5OH while compound **C** affords achiral compound **D**.

a) What are the structures of **A-D**? Show your reasoning.

b) What is the ratio **C/B** in the chlorination of **A**? Show work.

3. When 1-bromo-2,2-dideuteriocyclohexane is heated in the presence of sodium ethoxide in ethanol, the major product formed is a cyclohexene. What is its structure and why is it formed?

4. When (2*S*, 3*S*)-2-chloro-3-methylheptane (**A**) is heated in the presence of CH_3ONa/CH_3OH , two alkenes **B** (opt. active) and **C** are formed. When the (2*S*, 3*R*) diastereomer of **A** is subjected to the same reaction conditions, **B'** and **D** are formed.

a) What are the structures of **B, B', C** and **D**?

b) Is **B** or **C** the major product?

c) Is **B'** or **D** the major product?

d) How do **C** and **D** differ?

e) How do **B** and **B'** differ?

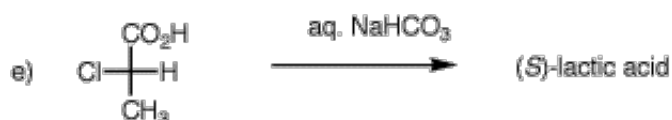
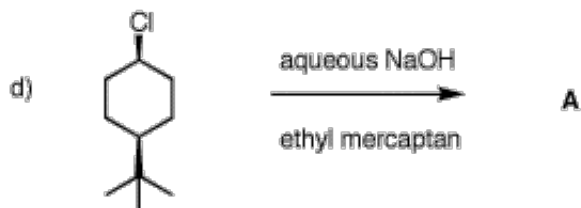
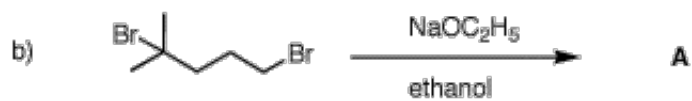
f) Illustrate the mechanism for the formation of **B, B', C** and **D**.

5. What are the structures of **A** in a)-d)? Explain and provide mechanisms for each of the five reactions.



Paul Walden (1863-1957)





6. Bromide **B** is the predicted major product derived from **A**. Bromide **G** is one of two conceivable structures derived from **F**. Bromide **B** is not the other one, nor is it a minor product from the bromination of **A**. Only **G** can be found. What are the structures **A-G**? Explain and illustrate.

