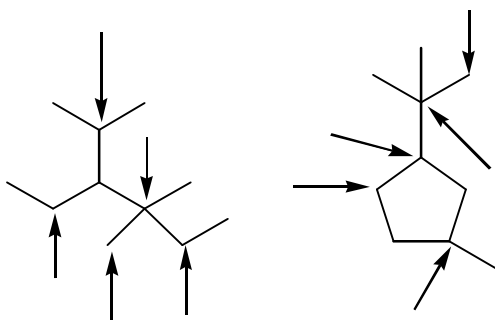


### Chem 233: Problem Set #3 (on Chapter 3)

1. Draw structural formulas for the FIVE constitutional (structural) isomers of  $C_6H_{14}$ . Hint: Start with a six carbon straight chain, then with a five carbon branched chain and finally with a four carbon branched chain. Give the IUPAC name for each constitutional isomer.
2. For an organic compound with the chemical formula  $C_3H_6O$ , there are many different constitutional isomers. Write a structural formula for  $C_3H_6O$  that designates a(n) ....
  - A. acyclic ketone
  - B. acyclic alcohol
  - C. carbocyclic alcohol
  - D. acyclic ether
  - E. acyclic aldehyde
  - F. heterocyclic ether (or epoxide)
  - G. How many degrees of unsaturation in each of the structures written in A-F? Remember, a double bond has one degree of unsaturation; a triple bond, two; and each ring, one.
3. Consider the hydrocarbon  $C_5H_6$ .
  - A. Draw different constitutional isomers for this molecule that contain:
    - I. a five carbon ring
    - II. a four carbon ring
    - III. a three carbon ring
    - IV. two double bonds (acyclic)
    - V. a triple bond (acyclic)
  - B. How many degrees of unsaturation in this hydrocarbon?
4. For the following sets of organic compounds, arrange in order from highest boiling point to lowest boiling point. Give a short explanation for the given boiling point order.
  - A. propane vs. hexane
  - B. 2,3,3-trimethylbutane vs. heptane vs. 3,3-dimethylpentane  
Note: All have the chemical formula  $C_7H_{16}$ .
5. Classify the labeled carbons as primary, secondary, tertiary, or quaternary.

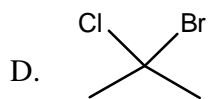


6. Name or draw structures for the following compounds. (Where appropriate, give both common and IUPAC names and show or label cis/trans stereochemistry.)

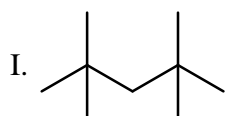
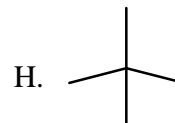
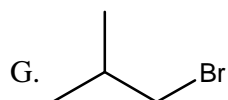
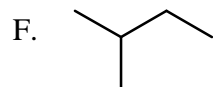
A. chloromethane

B.  $\text{CH}_2\text{Br}_2$

C. methylene iodide

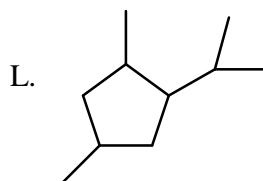


E. 1-chloro-2-ethylcyclobutane

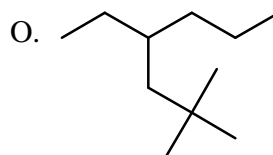
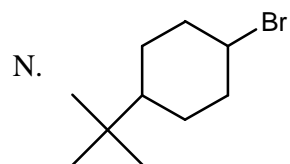


J. 4-ethyl-4-methylheptane

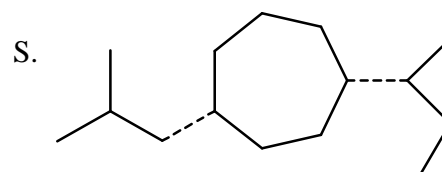
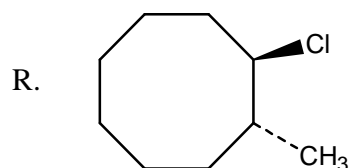
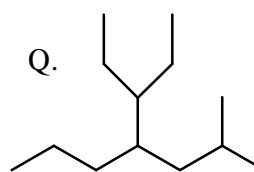
K. 2,6-dimethyl-4-propyloctane



M. chloroform



P. 4-chloro-5-isopropyl-6-methylnonane



T. *cis*-1,3-diethylcyclohexane

U. *trans*-1-methyl-2-propylcyclobutane