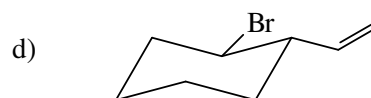
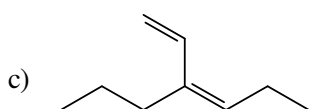
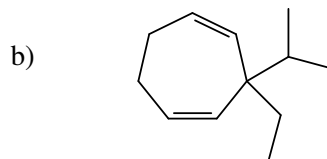
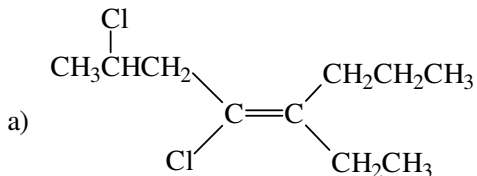
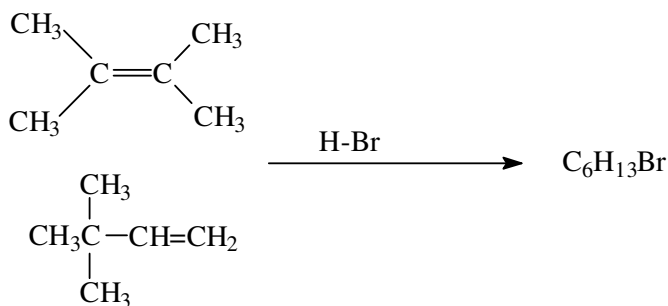


1.(16) Name the following compounds. Be sure to denote stereochemistry where appropriate.

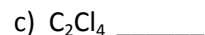
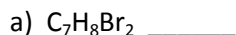


2.(12) The two alkenes **2,3-dimethyl-2-butene** and **3,3-dimethyl-1-butene** afford the *same alkyl bromide* as the major product upon the standard reaction with HBr (no peroxides, no hv; the product has a formula of $C_6H_{13}Br$). Propose a structure for the alkyl halide, and propose **polar mechanisms** that support the formation of this common product. Your mechanisms should show arrows to denote electron flow and show all intermediates.

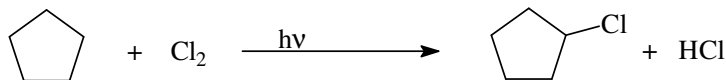
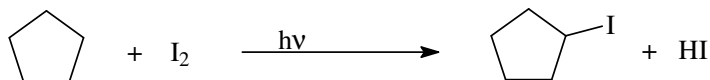
Which starting alkene is *more stable*?



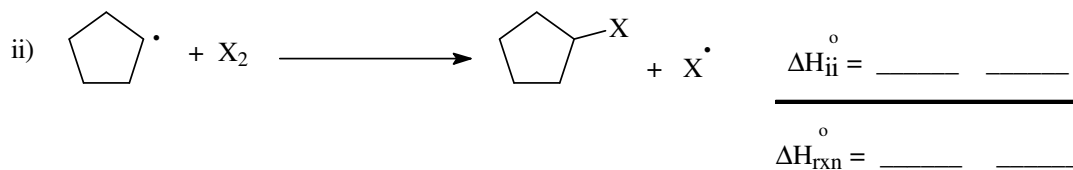
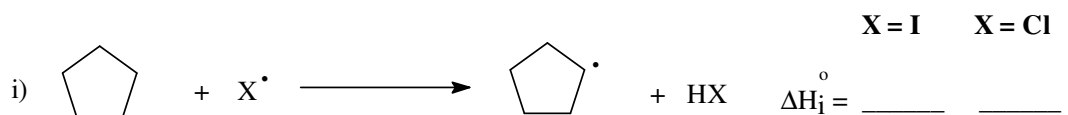
3.(6) Determine the number of degrees of unsaturation for the following molecules:



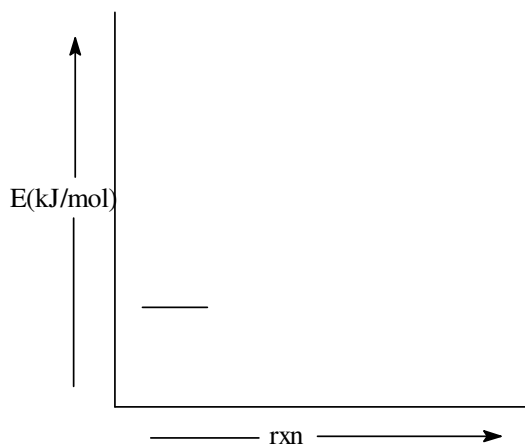
4.(16) The free radical **iodination** and **chlorination** of cyclopentane are shown below. Using the general mechanism below (where X = I in iodination; X = Cl in chlorination) and the table of bond dissociation energies provided, **determine ΔH_i , ΔH_{ii} and ΔH_{rxn} for both reactions** (in kJ/mol).



Propagation steps:

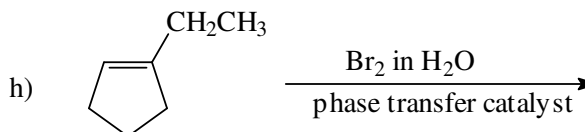
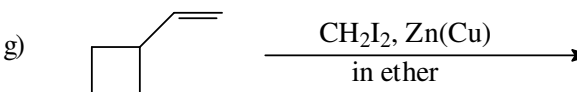
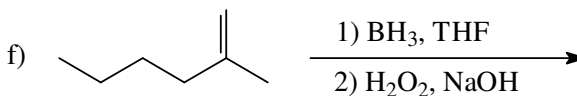
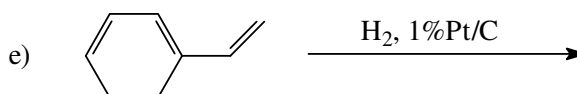
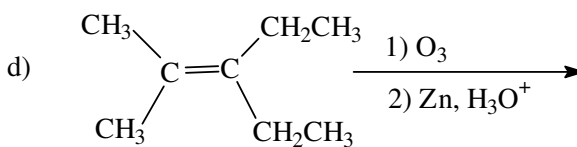
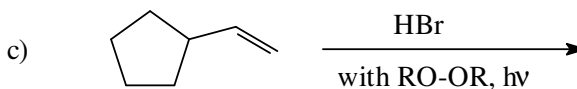
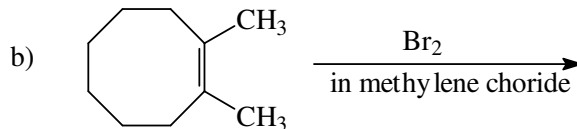
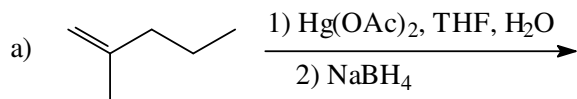


- a) On the axes below, construct a reaction profile for the two propagation steps for the **iodination reaction**. Keep the profile roughly to scale.
- b) With vertical arrows, label ΔH° for step i, ii and the overall rxn.
- c) Is this an *exothermic* or *endothermic* reaction? _____



<u>Bond</u>	<u>BDE (kJ/mol)</u>
I-I	152
Cl-Cl	242
2° C-H	410
2° C-I	229
2° C-Cl	354
H-I	298
H-Cl	431

5.(32) Give the major products of the following reactions:



6.(10) Draw 5 different zig-zag / polygon structures of C_5H_8 with the following characteristics:

a) no *double* bonds

b) no π bonds (different than a)

c) no rings

d) **two** others of your choice

7.(12) An unknown hydrocarbon **A** has a molecular formula of C_9H_{14} . Upon treatment with H_2 , Pt/C, two stereoisomers, compounds **B** (C_9H_{18}) and **C** (C_9H_{18}) are formed. Ozonolysis of **A** using O_3 followed by Zn and acetic acid gives three compounds: cyclohexane-1,3-dione, acetaldehyde and formaldehyde (shown below) . Identify hydrocarbons **A**, **B** and **C**.

