

CHEM 241-601

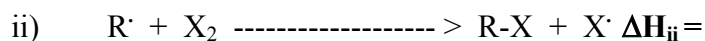
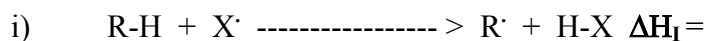
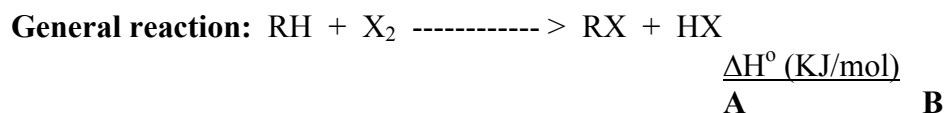
Problems from Wade chapters 3 and 4

1. Consider the molecule *trans* 1-bromo-4-methylcyclohexane and **draw the two flip chair conformations**. The energy difference between the two flip conformations is 9.6 KJ/mole. **Circle the more stable conformation**. If the energy of one methyl-H 1,3-diaxial interaction is 3.8 KJ/mol, what is the value of one bromine-H 1,3-diaxial interaction?

What is *more* spacially (sterically) demanding, a Br atom or a CH₃ group? _____

2. Free radical bromination of alkanes can be problematic because mixtures of products can result when more than one kind of C-H bond is present in the substrate. This is the case with the bromination of **propane** where **1-bromopropane (A)** and **2-bromopropane (B)** can form.

Using the general mechanism for the propagation steps i) and ii) shown below and the list of bond dissociation energies, determine ΔH_1 , ΔH_2 , and ΔH_{rxn} for each reaction (formation of **A** and **B**).



$$\Delta H_{\text{rxn}} =$$

- Which product is more likely to form, 1-bromopropane or 2-bromopropane? Explain.
- Which step is the rate-determining step, i) or ii)? Explain.
- Draw a reaction profile for the 2 steps in the reaction you chose in part b). Draw it as close to scale as you can.

<u>Bond</u>	<u>BDE (KJ/mol)</u>
Br-Br	193
H-Br	366
CH ₃ CH ₂ CH ₂ -H	420
(CH ₃) ₂ CH-H	401
CH ₃ CH ₂ CH ₂ -Br	285
(CH ₃) ₂ CH-Br	274