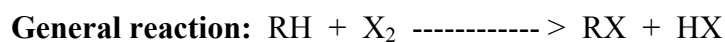


CHM 201
CH 5 problem

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**).



	ΔH° (KJ/mol)	
	A	B
i) $\text{R-H} + \text{X}^\cdot \text{-----} > \text{R}^\cdot + \text{H-X}$	_____	_____
ii) $\text{R}^\cdot + \text{X}_2 \text{-----} > \text{R-X} + \text{X}^\cdot$	_____	_____
	ΔH_{rxn} _____	_____

- a) Which product is more likely to form, 1-bromopropane or 2-bromopropane? Explain.
- b) Which step is the rate-determining step, i) or ii)? Explain.
- c) 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.

Bond	BDE (KJ/mol)
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

