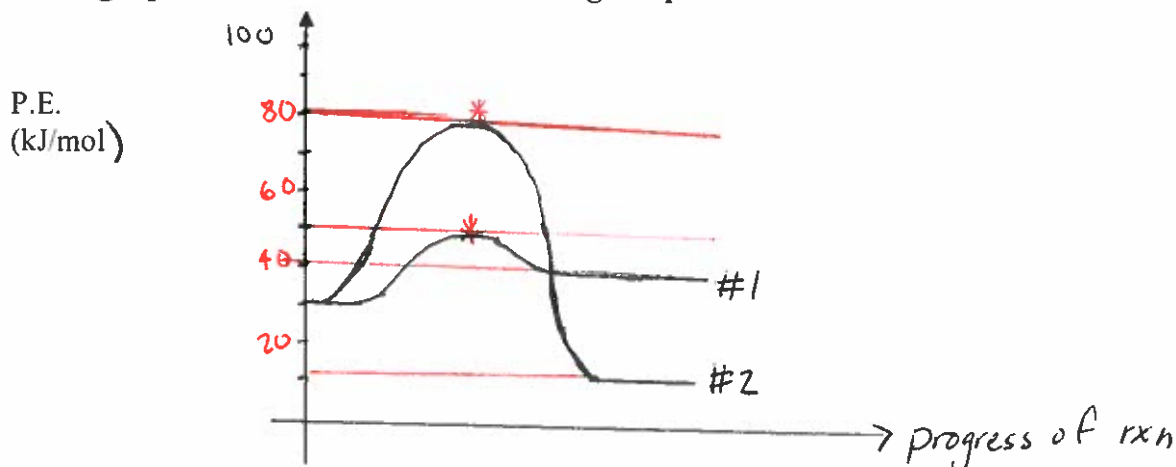


Use the graph below to answer the following six questions.



- 1) What is an activated complex? When does it form? Show where an activated complex forms in each of the reactions above (indicate it on the curves). * → Top of the curve

→ Bi-molecular collision

• very unstable!

• cluster of atoms

• exists $\sim 1 \times 10^{-3}$ sec

• all KE is converted into PE

• Bonds are broken + formed here.

- 2) What is the ΔH for each reaction, include the proper sign (+). $\Delta H_{\#1} = +10 \text{ kJ/mol}$ $\Delta H_{\#2} = -20 \text{ kJ/mol}$

- 3) What is the activation energy (E_A) of each reaction? (forward) $E_{A\#1} = 20 \text{ kJ/mol}$ $E_{A\#2} = 50 \text{ kJ/mol}$

- 4) Which of these reactions is exothermic? Explain why, using a discussion centered on the breaking & making of bonds.

#2 is exothermic

more energy was released when bonds were ^{formed} than the amount absorbed to break the bonds.

- 5) Which reaction would tend to go faster (all conditions are constant)? Explain using data on the graph.

rxn #1 would proceed faster because E_A is lower.

It is more likely that two molecules have enough energy on impact to form an activated complex.

* more successful collisions = faster

- 6) If reaction #2 were run in the reverse direction what would be it's: $\Delta H = +20 \text{ kJ/mol}$ $E_A = 70 \text{ kJ/mol}$

- 7) Why is it that not all collisions of reactant molecules result in a chemical reaction?

Not all collisions have sufficient energy to reach E_A .

Bonds are therefore not broken or re-formed.