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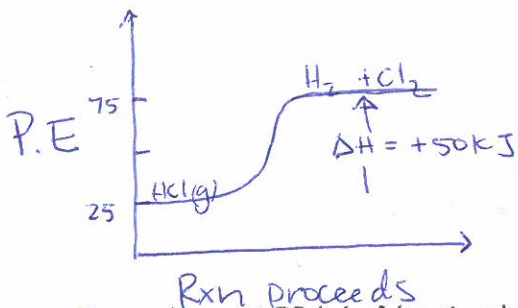
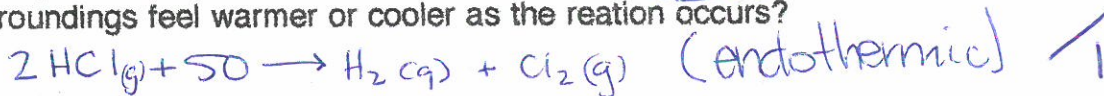
Chemistry 12
REACTION KINETICS
Lesson #6 + 7 ENTHALPY CHANGES + KINETIC ENERGY
DISTRIBUTIONS

Read in your Hebden pgs 13-16 then answer the following questions:

1. When breaking the Cl-Cl bond in Cl₂, what happens to the POTENTIAL ENERGY of the molecule? What happens to the KINETIC ENERGY of the molecule?

- 1/2 (a) The PE must INCREASE (to have sufficient energy to separate) 1/2
 (b) The KE must DECREASE

2. The change in enthalpy is +50 KJ for the reaction 2 HCl (g) → H₂ (g) + Cl₂ (g). Rewrite this equation so that the energy term appears in the chemical equation. Then DRAW a graph of "Potential Energy" vs "reaction proceeds", showing the relative enthalpies of the reactant and products, and the enthalpy change. Will the surroundings feel warmer or cooler as the reaction occurs?



The surroundings will feel COOLER 1/2

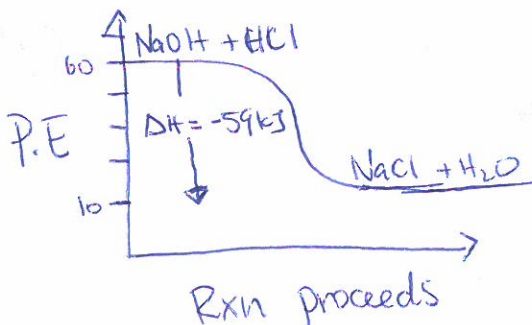
3. If a reaction releases 20 kJ of heat, what is the change in enthalpy for the reaction?

1/1 $\Delta H = -20 \text{ kJ}$ 1

4. What is the change in enthalpy for the reaction NaOH + HCl → NaCl + H₂O if 59 kJ of heat is absorbed by the surroundings? Which will have more energy, reactants or products? Draw a graph of "Potential Energy" vs "reaction proceeds" showing the relative enthalpies of the reactant and product and enthalpy change?

1/1 $\Delta H = -59 \text{ kJ}$

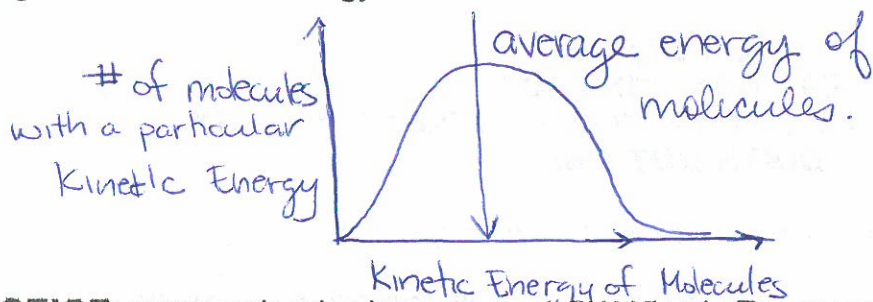
1/4 The Reactants have more Potential energy (exothermic) 1



1/2

KINETIC ENERGY DISTRIBUTIONS

In general, a Kinetic Energy Distribution curve looks like this:

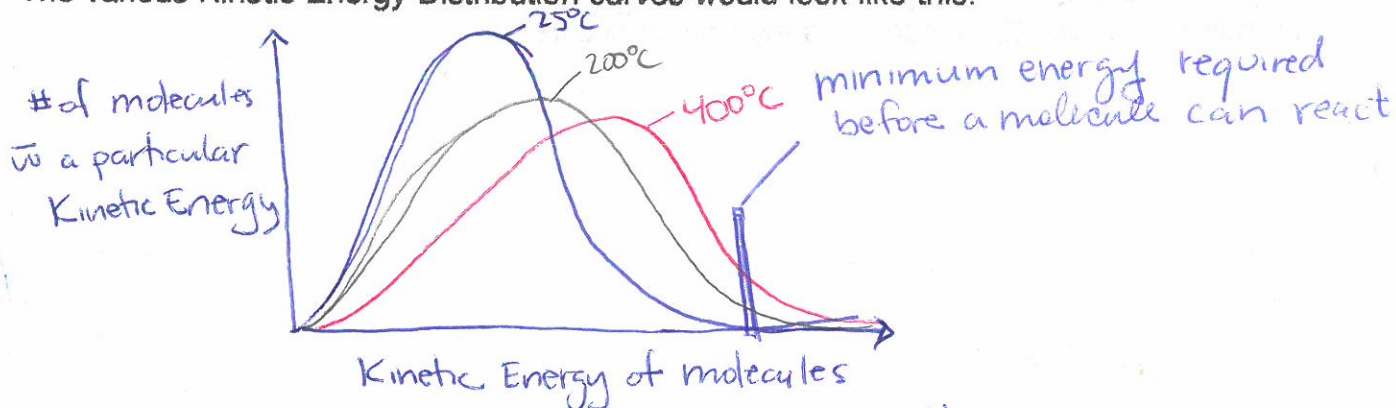


NOTICE: some molecules have a very LOW Kinetic Energy and some have a very HIGH Kinetic Energy while molecules most have an AVERAGE Kinetic Energy

For the chemical reaction : $C_2H_5OH \rightarrow C_2H_4 + H_2O$ at:

- 25 degrees celcius rxn rate does not occur @ detectable rate
- 200 degrees celcius rxn rate is very slow
- 400 degrees celcius rxn rate is relatively RAPID.

The various Kinetic Energy Distribution curves would look like this:



- @ 25°C - only very few with enough KE to react.
- @ 200°C - more molecules with enough KE to react
- @ 400°C - the most molecules with enough KE to react

IMPT: the increased reaction rate due to an increase in TEMPERATURE is PRIMARILY DUE to the increased number of molecules with sufficient Energy!!!!

General CHEMISTRY rule for SLOW REACTIONS: (see figure on pg 19 in HEBDEN)

a 10°C temperature $\uparrow \rightarrow$ DOUBLES the rxn rate!

Seatwork/Homework: Exercises 29- 32 pgs 19 -20

PLO's: B5, part of B6, B7, and B8