Name: Key
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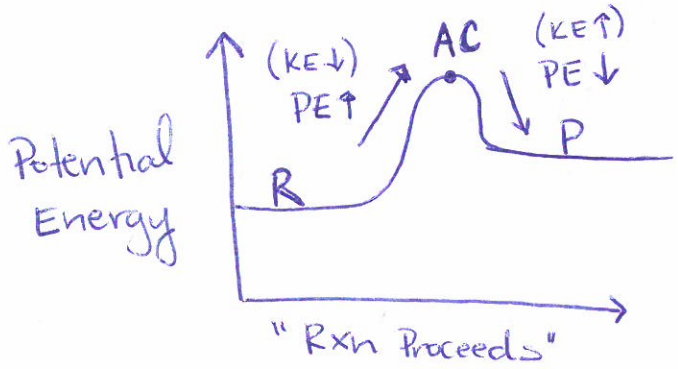
# Chemistry 12
## REACTION KINETICS
### *Lesson # 8 ACTIVATION ENERGIES*

ON THE POTENTIAL ENERGY DIAGRAM BELOW WE DESCRIBE WHAT HAPPENS AS A CHEMICAL REACTION OCCURS:




- as the reactants approach each other their PE ↑ (é repulsion) as KE ↓
- @ AC the PE is converted to KE
- as particles separate from the AC the KE ↑ ∴ PE ↓

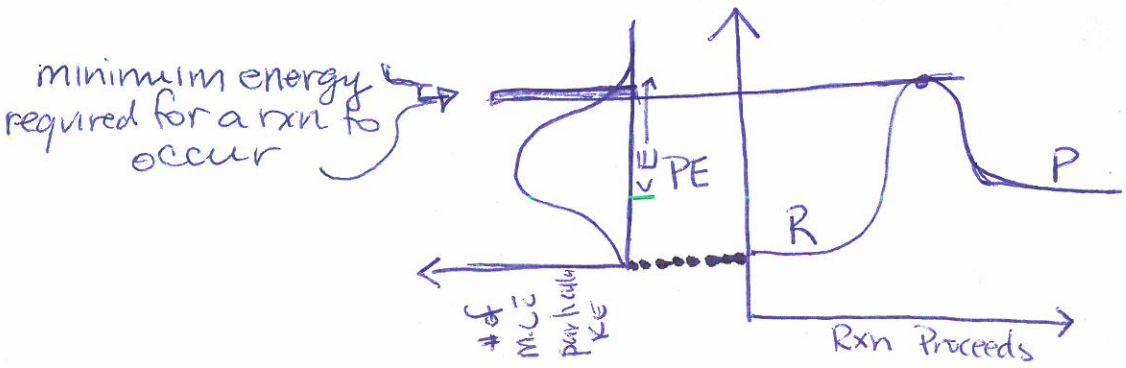
ACTIVATED COMPLEX: the arrangement of atoms which occurs when the reactants ARE IN THE PROCESS OF REARRANGING to form products (an intermediate molecule)

ACTIVATED ENERGY ($E_a$): the minimum Potential Energy required to change the reactants into the ACTIVATED COMPLEX.

When two molecules approach one another they will start to convert KE into PE and climb the "energy hill", therefore "spending" their KE to "buy" PE. There THREE possible outcomes:

1. KE less than required PE (ineffective collision)
2. KE just equals required PE (a successful collision is possible)
3. KE is greater than required PE → ~~collision will result in a~~ (successful collision is possible)

A collision between two particles is EFFECTIVE if the collision results in a reaction:



Recall from lesson # 5 the COLLISION THEORY, a collision is only successful if the molecules collide with:

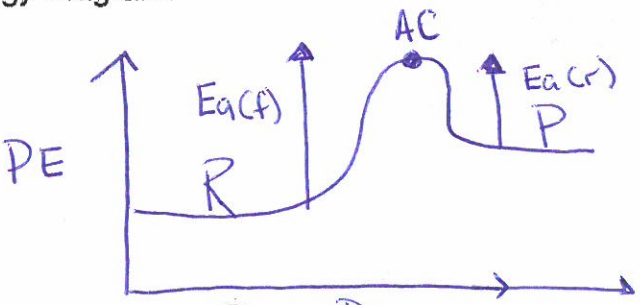
a. correct geometry (alligment)

b. sufficient KINETIC ENERGY

One of the main PRINCIPLES of Chemistry 12 is that OF EQUILIBRIUM !!!
A chemical reaction can go either from reactants to products or from products back to reactants.

Reactants $\rightleftharpoons$ Products.

To indicate the reversiblity of chemical reactions we have to demonstrate it on the Potential Energy Diagram.

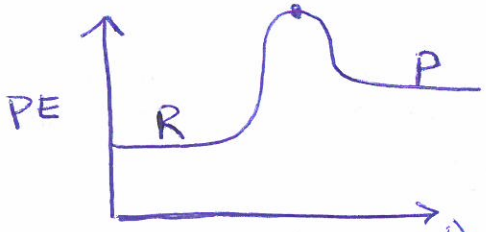



$\Delta H$ = +'ve
endothermic forward rxn.

Where $E_a$ (f) = Activation energy of FORWARD reaction R → P
and $E_a$ (r) = Activation energy of REVERSE reaction P → R

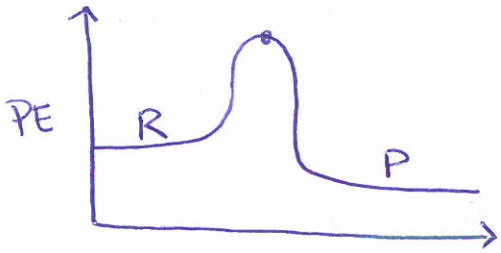
NOTE: the activation energy is always ~~ENDOTHERMIC~~ POSITIVE: energy must be added to reach the activated complex.

ENDOTHERMIC REACTIONS: (forward) ; exothermic reverse rxn




$\Delta H = P - R$
$\Delta H$ = +'ve

EXOTHERMIC REACTIONS: (forward) ; endothermic reverse rxn.




$\Delta H = P - R$
$\Delta H$ = -'ve

**Seatwork/Homework**: Excercises 33-45 pg 23-25
**PLO's**: B2, B3, B4, B5 and B6