

Rate Affecting Factors

p. 227 – KCQ

Target: I can explain how rate affecting factors change the speed of a reaction

Collision theory

Reactants must collide in order to react

Activation energy

Minimum amount of energy colliding particles need in order to react.

*Fast Enough AND Correct
Orientation*

Factors of Reaction Rate

1. Temperature
2. Concentration
3. Surface area
4. Catalysts

Increase any of these, you get more effective collisions... so it goes faster!

Temperature

Higher temperature

- = Higher kinetic energy
- = More collisions AND more effective collisions
- = More likely to get over the activation curve
- = faster rate



Concentration Higher Concentration

= More particles

= More chances of properly aligned collisions

= Faster rate

UP TO A POINT!!!



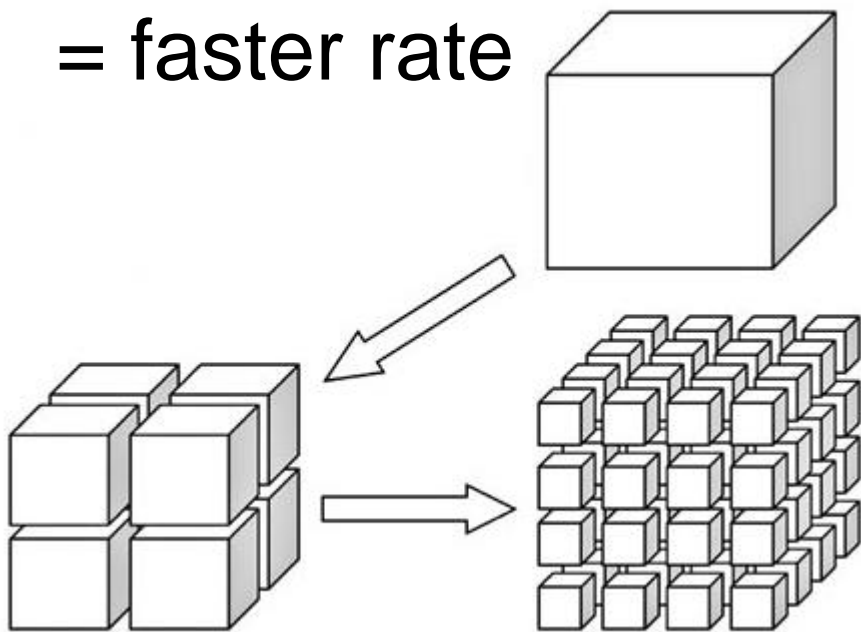
Surface Area

More Surface Area

= More access to
chemicals

= more collisions

= faster rate



Catalysts



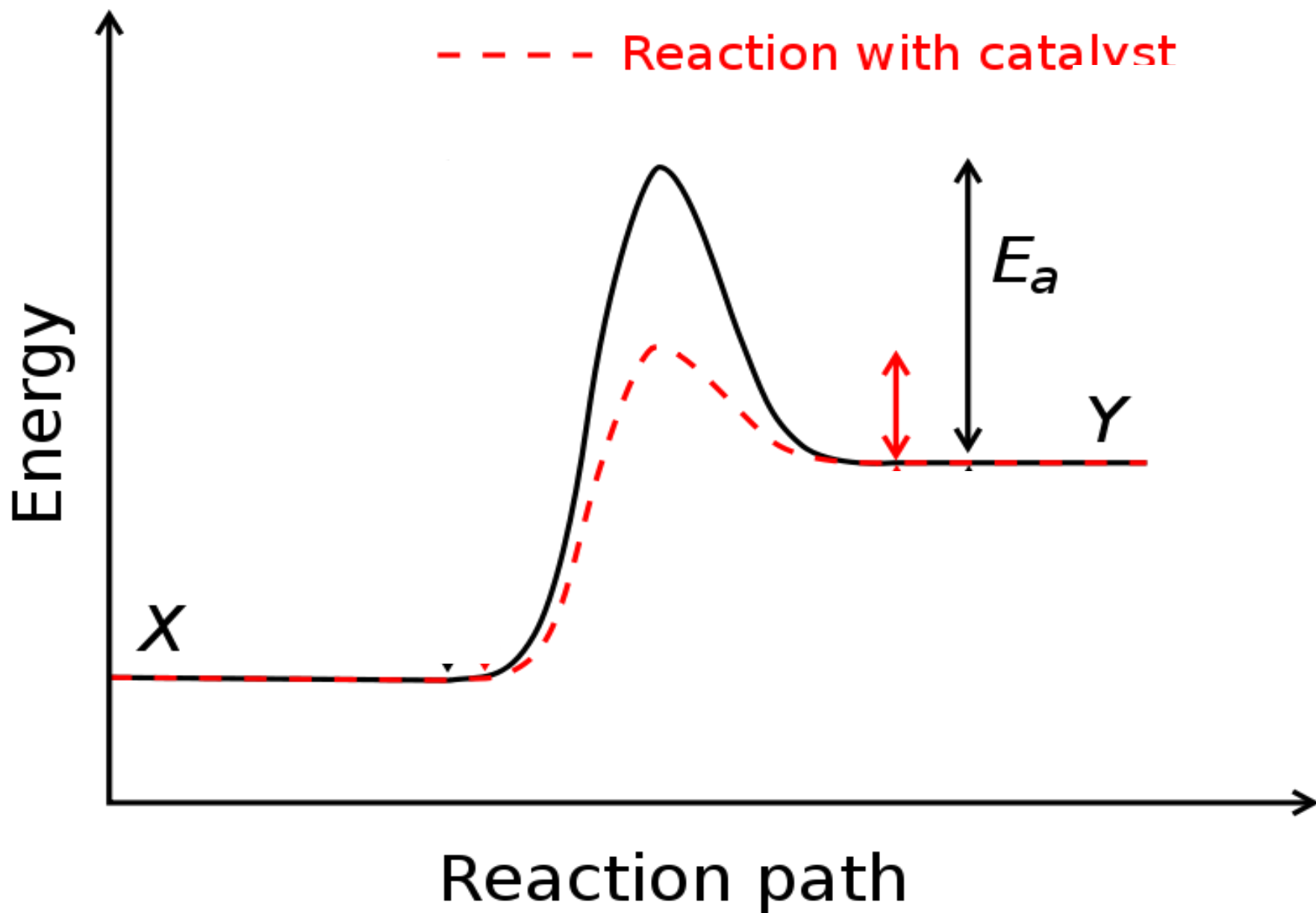
What is it?

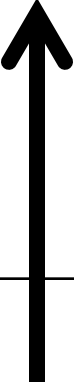
- A chemical that you add to rxn
- Does NOT get used up during reaction
- Helps orient molecules to reach transition state easier
 - So you do not need as much energy
 - **Lowers Activation Energy**
 - = faster reaction BECAUSE more molecules will have the needed energy to get over E_a

You don't get "more" collisions – you just get more collisions that will be EFFECTIVE!

— Reaction without catalyst

- - - Reaction with catalyst



Changes # of Collisions	Changes Activation Energy
	

**it changes the # of
EFFECTIVE collisions**

- 1) Enthalpy and Entropy: Why do reactions happen?
 - a. <https://www.youtube.com/watch?v=8m6RtOpqvtU&app=desktop>

- 2) Activation energy – Energy and Orientation, Maxwell-Boltzmann Distribution and relationship to EA and change in temperature
 - a. <https://www.youtube.com/watch?v=YacslU97Ofc&app=desktop>

- 3) Reaction Rates – General Rate Expression and
 - a. <https://www.youtube.com/watch?v=6mAqX31RRJU&app=desktop>

- 4) Catalysts – great graph showing catalyst changing one step into two steps
 - a. <https://www.youtube.com/watch?v=KYD5LNVWne8&app=desktop>

- 5) Catalyst Classes – general info
 - a. <https://www.youtube.com/watch?v=OfP5h1T2KJI&app=desktop>