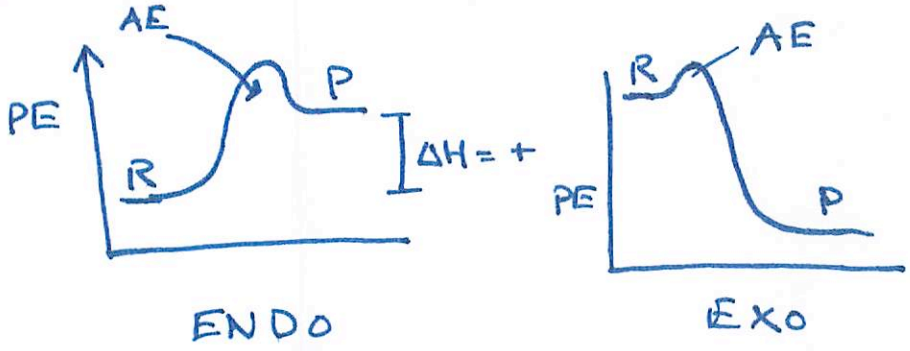
Ch 19.1

Reaction Rate - speed at which a reaction proceeds → mol product formed / time

Collision Theory - atoms have to collide with sufficient energy (→ molec kinetic energy) and proper orientation in order to react
(see ohead) → alignment

Activation energy (AE) - energy needed to start a reaction
(see endo and exo diagrams)



Factors affecting Rate

1) *Temperature* - higher temp, stronger, more frequent collisions = faster rate

2) *Concentration* - more collision possibility = faster rate

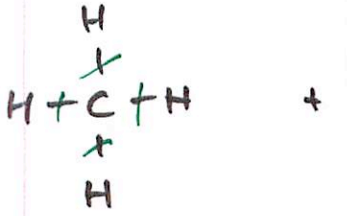
3) *Surface Area* - more exposed surface = more collisions = faster rate (rounds vs. kindling)

4) *Catalysts* - chemicals that speed up reactions but aren't consumed in reaction
   bio catalysts = enzymes (type of protein)
   - most catalysts provide surface to allow reactions to occur (see ohead)
   - catalysts lower activation energy of reaction they are 'catalyzing'

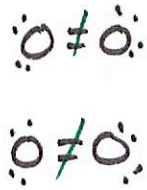
Demo: lycopodium powder
elephant toothpaste

Energy in RXNS

① Energy in to break bonds - endo (+)



411 kJ/mol × 4

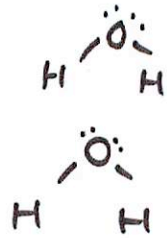


494 kJ/mol × 2

+2632 kJ

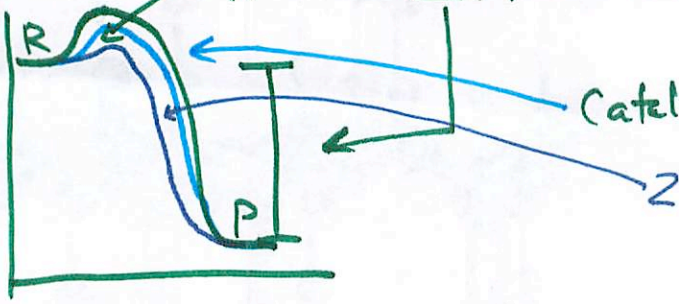
② Energy out when new bonds form (-)

799 kJ/mol × 2



459 kJ/mol × 4

-3434



$\Delta H = -802$ kJ

} lower the activation energy