LAW OF MASS ACTION, PART 2: KINETICS

EQUILIBRIUM SYSTEMS ARE DYNAMIC

REACH A STEADY STATE WHERE:

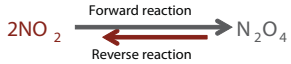
*REACTIONS CONTINUE TO OCCUR

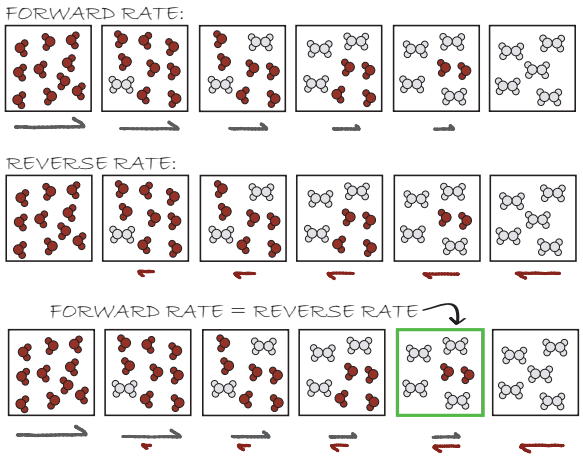
*CONCENTRATIONS NO LONGER CHANGE

HOW CAN THIS BE?

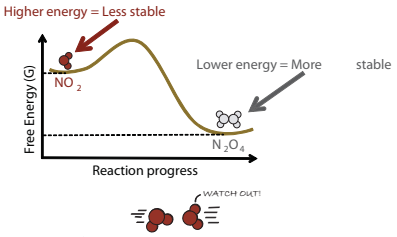
*AT EQUILIBRIUM, FORWARD AND REVERSE REACTIONS HAPPEN AT THE SAME RATE

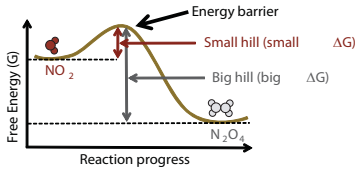
*MAKING PRODUCT AS FAST AS YOU BREAK IT DOWN





CHEMISTRY REQUIRES ENERGY





FORWARD REACTION IS FASTER!

MOLECULAR COLLISIONS PROVIDE THE ENERGY TO "CLIMB" THE HILL

SMALLER HILL = MORE PRODUCTIVE COLLISIONS

THE RATE CONSTANT, k, IS HOW FAST THE CHEMISTRY CAN HAPPEN

k = # OF COLLISIONS X PROBABILITY OF A SUCCESSFUL COLLISION

HIGHER TEMP MEANS HIGHER k

k_1 FORWARD REACTION

k_{-1} REVERSE REACTION

RATE CONSTANTS ≠ RATES OF REACTION

RATE OF REACTION, r

r = HOW FAST x HOW MUCH = k x CONCENTRATION

$r_{forward} = k_1[NO_2]$

$r_{reverse} = k_{-1}[N_2O_4]$

UNITS ARE M/s

RATE OF REACTION CHANGES UNTIL EQUILIBRIUM IS REACHED

$r_{forward} = r_{reverse}$

$k_1[NO_2] = k_{-1}[N_2O_4]$

$$\frac{k_1}{k_{-1}} = \frac{[N_2O_4]}{[NO_2]} = K$$