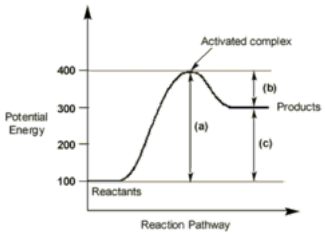
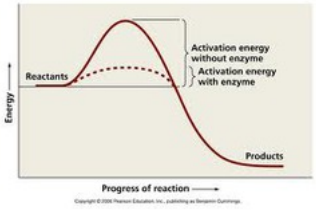
Kinetics

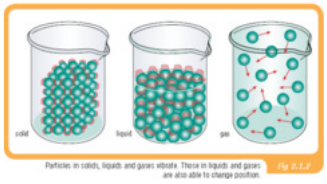
Study online at https://quizlet.com/_6nr4c7

1.	**rate**	measure of the speed of any chance that occurs within an interval of time
2.	**reaction rate**	change in concentration / time
3.	**collision theory**	For a reaction to occur, the particles must collide, they must collide with the appropriate orientation, and they must collide with sufficient energy (called activation energy)
4.	**activated complex**	an unstable arrangement of atoms that exists momentarily at the peak of the activation-energy barrier; an intermediate or transitional structure formed during the course of a reaction 
5.	**activation energy**	Energy needed to get a reaction started (space between activated complex and potential energy) 
6.	**Factors that affect reaction rate**	temperature, concentration, particle size, catalyst

7.	**Enzymes**	Catalysts for chemical reactions in living things
8.	**Inhibitor**	A substance that slows down or stops a chemical reaction
9.	**Rate law**	an expression relating the rate of a reaction to the concentration of the reactants
10.	**first order reaction**	a reaction in which the reaction rate is proportional to the concentration of only one reactant (increase concentration by 2 increase reaction rate by 2)
11.	**second order reaction**	a reaction whose rate depends on the concentration of one reactant raised to the second power or on the concentrations of two different reactants, each raised to the first power (increase concentration by 2 increase reaction rate by 4)
12.	**third order reaction**	The rate is proportional to the cube of the concentration (increase concentration by 2 increase reaction rate by 8)
13.	**Overall order of reaction**	The sum of the powers to which the concentration terms are raised in the rate equation

14.	**reaction mechanism**	the step-by-step sequence of reactions by which the overall chemical change occurs
15.	**rate-limiting (rate-determining) step**	the slowest step in a pathway
16.	**chemical equilibrium**	In a chemical reaction, the state in which the rate of the forward reaction equals the rate of the reverse reaction, so that the relative concentrations of the reactants and products do not change with time.
17.	**Equilibrium is affected by**	temperature, pressure, concentration
18.	**Equation for equilibrium constant**	K= products/reactants
19.	**K > 1**	product favored
20.	**K < 1**	reactant favored
21.	**K = 1**	Reaction will reach equilibrium as an intermediate mixture, meaning the amounts of products and reactants will be about the same.
22.	**LeChatelier's Principle**	When a stress is applied to a system at equilibrium, the equilibrium shifts to relieve the stress
23.	**increase concentration**	shift to opposite side

24.	**decrease concentration**	shift to same side
25.	**Exothermic**	Chemical Reaction in which energy is primarily given off in the form of heat
26.	**Endothermic**	(of a chemical reaction or compound) occurring or formed with absorption of heat
27.	**Increase temperature (exothermic)**	shift left
28.	**Decrease temperature (exothermic)**	shift right
29.	**increase temperature (endothermic)**	shift right
30.	**Decrease temperature (endothermic)**	shift left
31.	**increase pressure/decrease volume**	shift to side with less moles of gas
32.	**decrease pressure/increase volume**	side with most moles of gas
33.	**Addition of a catalyst**	decreases activation energy only (no change in equilibrium)
34.	**spontaneous process**	A process that occurs without an overall input of energy; a process that is energetically favorable.
35.	**Entropy (S)**	A measure of disorder or randomness.
36.	**Entropy increases when**	Gases are formed from liquids and solids; Liquids or solutions are formed from solids;

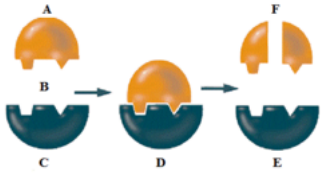
		The number of gas molecules increases; the temperature rises; The number of moles increases.
37.	**2nd law of thermodynamics**	Every energy transfer or transformation increases the entropy of the universe.
38.	**Enthalphy (Ꮒ)**	heat
39.	**equation for enthalpy**	H= H (product) - H (reactant)
40.	**Gibbs free energy (G)**	A measure of the spontaneity of a process
41.	**Equation for Gibbs Free Energy**	G = H - T S (temperature)
42.	**If S + and H +**	spontaneity at high temperature
43.	**If S - and H +**	No spontaneity ever
44.	**If S + and H -**	spontaneity always
45.	**If S - and H -**	spontaneity at low temperature
46.	**If enthalpy is zero**	the element is in standard state
47.	**kinetics**	Study of reaction rates and steps 

48. **collision theory**

says; crashes must be proper and sufficient

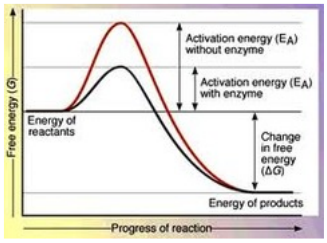
49. **activated complex**

a transitional structure between reactants and products



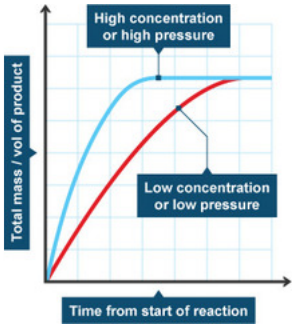
50. **activated energy**

= minimal requirement for "lift off"



51. **reaction rates**

speed at which things happen i.e. reactants become products

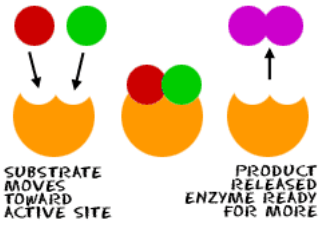


52. **heterogeneous reactants**

reactants that are in different phases

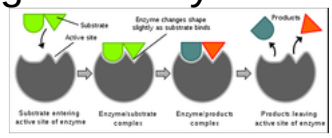
53. **heterogeneous catalysts**

catalysts that are in different phases than the reactants



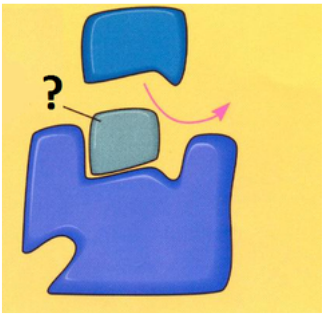
54. **enzymes**

biological catalysts



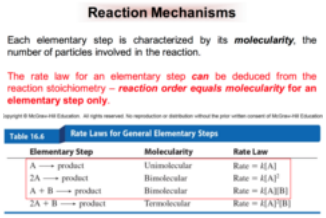
55. **inhibitors**

prevent chemical reaction



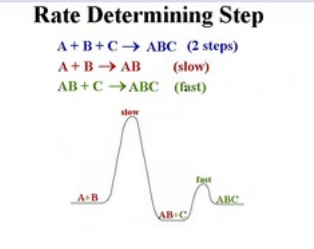
56. **elementary steps**

intermediate products of chemical reactions



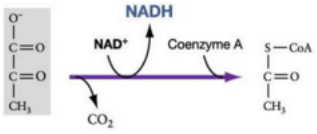
57. **rate determining steps**

the slowest intermediate reaction



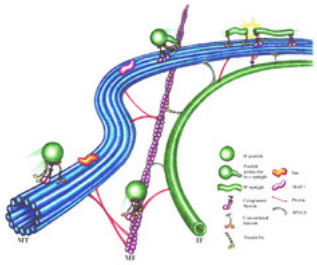
58. **complex reaction**

sum of intermediate reactions



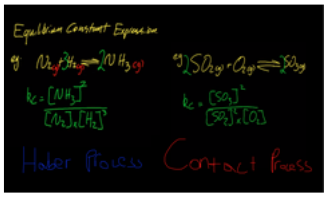
59. **intermediates**

products produced before the final product



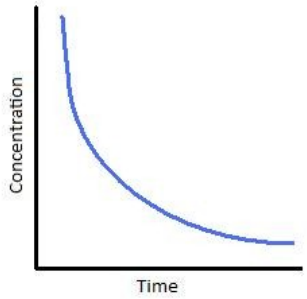
60. **homogeneous reaction**

everything is in the same phase



61. **reaction order**

effect of concentration 0, 1, 2



62. **rate law**

an equation that describes speed of reaction

$$\text{Rate} = k[A]^m[B]^n$$

63. **specific rate constant**

K / (everything except concentration) i.e. temperature, the ideal gas constant, activation energy, catalysts according to Arrhenius's equation.

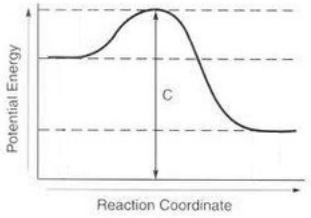
$$k = Ae^{-E_a/RT}$$

or

$$\ln k = \ln A - \frac{E_a}{RT}$$

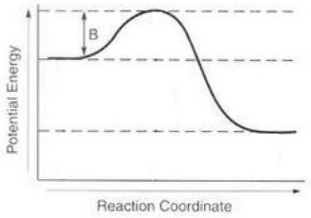
64. **PE of Activated Complex**

the maximum energy point along the reaction path



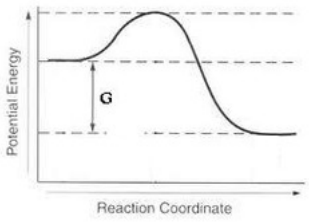
65. **Activation Energy for the Forward Reaction**

The minimum energy required to convert reactant(s) into product(s); the difference between the energies of the activated complex and the reactants()



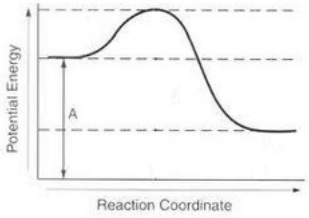
66. **Heat of Reaction**

the difference of Potential Energy between the Reactant(s) and Product(s).



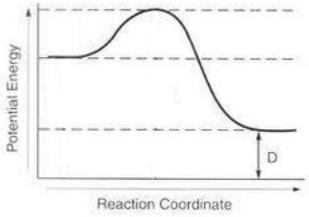
67. **Potential Energy of Reactants**

Amount of Potential Energy stored on the reactants.



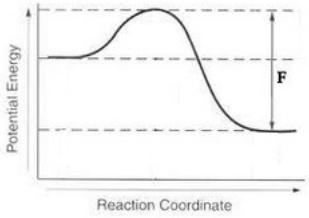
68. **Potential Energy of Products**

Amount of Potential Energy stored on the products.



69. **Activation Energy for the Reverse Reaction**

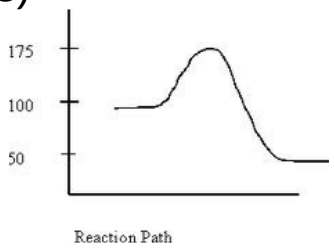
The minimum energy required to convert product(s) back into reactant(s); the difference between the energies of the activated complex and the products()



70. **Exothermic PE Diagram**

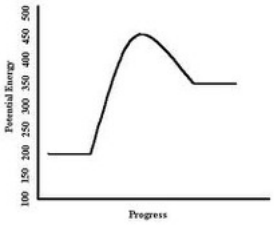
a chemical reaction where the Potential Energy of the product(s) is lower than that of the reactant(s). The chemical equation is going

to represent energy wirtten with the poroduct(s) or substracted from the reactant(s)



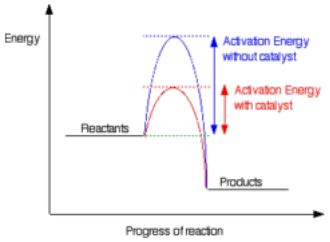
71. **Endothermic PE Diagram**

a chemical reaction where the Potential Energy of the product(s) is higher than that of the reactant(s). The chemical equation is going to represent energy wirtten with the reactant(s) or substracted from the product(s)



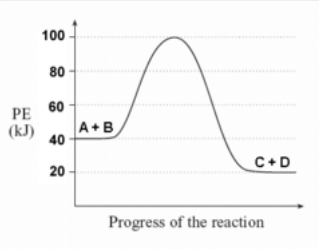
72. **Catalyst**

Substance that decreases activation energy and increases reaction rate in a chemical reaction



73. **PE Diagram reactants**

A + B



74.	**Exothermic**	Releases heat during the reaction and the temperature of the environment rises
75.	**Endothermic**	Take in heat from the environment during a reaction and the temperature of the environment drops
76.	**Delta H**	Change in heat, heat of reaction
77.	**Delta H = positive**	endothermic
78.	**Delta H = negative**	exothermic
79.	**endothermic**	a positive change in heat
80.	**Exothermic**	a negative change in heat
81.	**For an exothermic reaction is the heat on the right or left side of the arrow? and is the heat of reaction positive or negative?**	right, positive
82.	**kinetics**	the branch of chemistry that is concerned with the rates of chemical reactions
83.	**What is the formula for change in heat?**	heat of products- heat of reactants
84.	**What is the amount of energy needed to start a rxn called?**	activation energy

85. **catalyst**

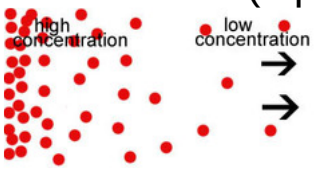
substance that speeds up the rate of a chemical reaction without being used up or changed itself

86. **chemical reaction**

the process by which one or more substances change to produce one or more different substances

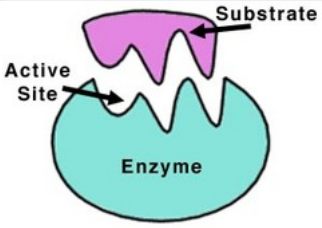
87. **concentration**

A measurement of how much solute (dissolved solid) exists within a certain volume of solvent (liquid)



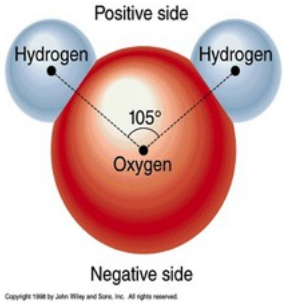
88. **enzyme**

protein catalyst that speeds up the rate of specific biological reactions



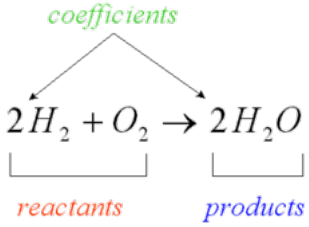
89. **molecule**

two or more atoms held together by covalent bonds



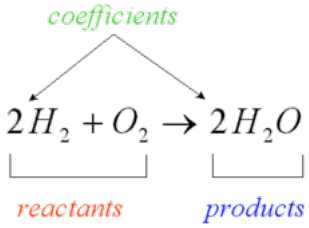
90. **product**

A substance produced in a chemical reaction



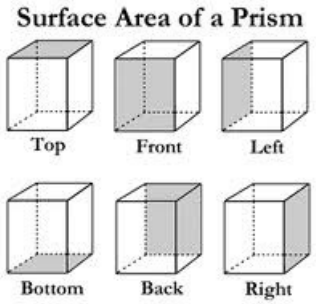
91. **reactant**

A chemical substance that is present at the start of a chemical reaction and is used up in the reaction

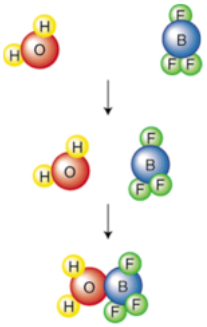


92. **surface area**

the sum of the areas of all the faces of a solid figure



93. **Collision Theory** — states that chemical reactions can occur when atoms, ions, and molecules collide, with enough energy, in the correct orientation



94. **Temperature** — the kinetic energy of the particles (how fast they are moving) - higher temp = higher speed

95. **How does higher temperature increase rate of reaction** — Particles have more energy = move faster = more frequent successful collisions

96. **Successful collision** — Collision with enough energy (activation energy), and in the correct orientation for a reaction to occur

97. **Give 3 ways you can increase rate of reaction** — Increase temperature
Increase concentration (pressure if a gas)
Increase surface area
Catalyst

98.	**How does increasing surface area increase rate of reaction**	Particles have more area (exposed particles) to collide with = more frequent collisions
99.	**How does higher concentration increase rate of reaction**	more particles of reactant in a given volume = more frequent collisions
100.	**How does higher pressure (in a gas) increase rate of reaction**	Particles more compressed together = more frequent collisions
101.	**How can you measure rate of reaction (2 ways)**	Measure the rate at which a reactant is used up Measure the rate at which a product is produced