

Name:

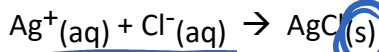
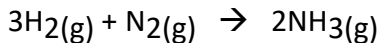
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Chemistry 12 – Lesson 3 – Factors Affecting Reaction Rates ~~12~~

There are 2 kinds of reactions:

Homogeneous Reactions – all reactants are in the same phase.
We DO NOT consider the products here.

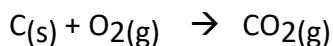
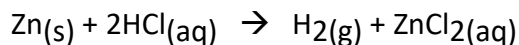
Example:



— doesn't matter part of products

Heterogeneous Reactions – different phases in reactants

Example:



Factors that affect both homogeneous and heterogeneous reactions

1) Temperature

- As temperature increases, rate increase

2) Concentration of reactants

- As concentration increases of one or more reactants, rate increases

3) Pressure

- As pressure increases, rate increases

- Only affects reactions with gases in the reactants

- Pressure can be increased by decreasing the volume of a container

$\uparrow P = \uparrow \text{rate}$
 $\downarrow V = \uparrow \text{rate}$

4) Nature of reactants

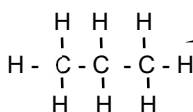
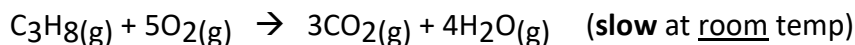
Bonds

- Rate depends on the strength and number of bonds in a reaction that need to be broken.

- In general, covalent bonds are strong and slow to break.

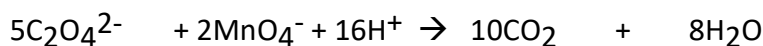
(non-metal/non-metal)

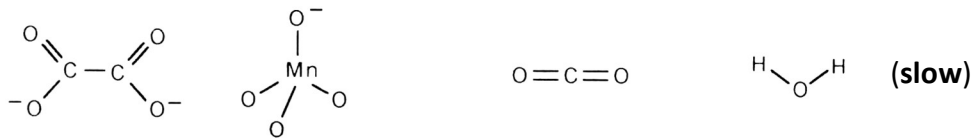
Example:



strong covalent bonds between C-C and C-H atoms

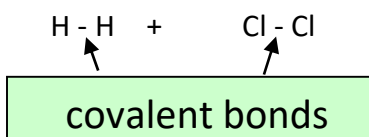
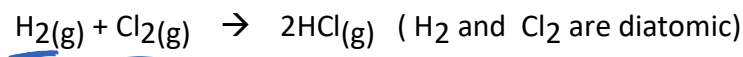
Example:





Many bonds have to be broken and many new bonds have to form. So this reaction is slow at room temperature.

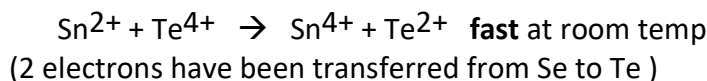
Example:



slow at room temp.

When only electrons have to be transferred reactions can be very fast because no bonds are breaking or forming

Example:

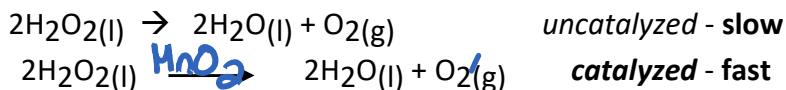


5) Phase

- Reactions with solids are very slow because the reactants cannot move freely
- Reactions with gases are fast because of the rate in which the particles move but watch for diatomic bonds which are covalent
- Reactions with liquids are fast because of the close proximity of the atoms
- Reactions with aqueous ions are the very fast because of close proximity, charges attracting

6) Catalysts

- A substance which can be added to increase the rate of a reaction without being consumed itself.



▶ enzymes

Inhibitors

- A substance which can be added to slow the rate of a reaction

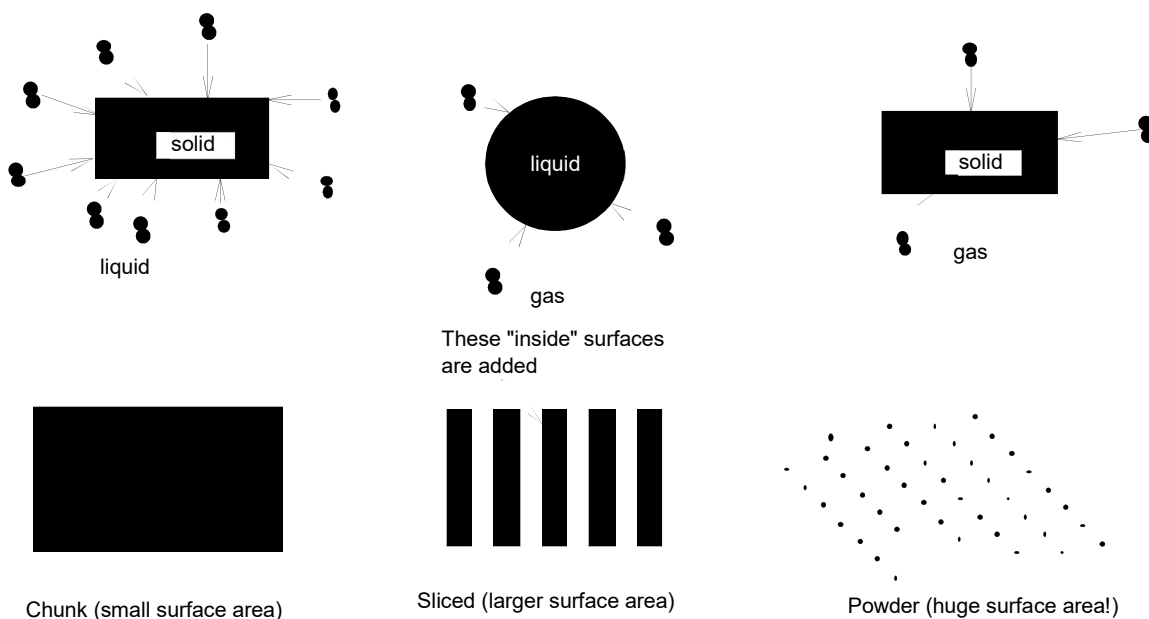
Examples:

- poisons (cyanide)
- antibiotics
- antidepressants (serotonin reuptake inhibitors stop the uptake of serotonin into the brain so more gets made)
- sunscreens (stops production of melanin)

Factors affecting only heterogenous reactions

7) Surface area

- When 2 different phases react, the reaction can only take place on the surface
- An increase in surface area will increase the places for the atoms to meet; therefore, increasing the rate
- Increase the surfaces area by cutting solids into smaller pieces or making liquid into smaller droplets



➤ Which of the following reactions will be slowest at 25°C?

- A. $\text{Cu}_{(s)} + \text{S}_{(s)} \rightarrow \text{CuS}_{(s)}$
- B. $\text{H}^+_{(aq)} + \text{OH}^-_{(aq)} \rightarrow \text{H}_2\text{O}_{(l)}$
- C. $\text{Pb}^{2+}_{(aq)} + 2\text{Cl}^-_{(aq)} \rightarrow \text{PbCl}_{2(s)}$
- D. $2\text{NaOCl}_{(aq)} \rightarrow 2\text{NaCl}_{(aq)} + \text{O}_{2(g)}$

Pg. 7 # 10

Pg. 8 # 12-14

Pg. 9 # 15-16

Pg. 10 # 17 pay close attention to the graphs – be sure you understand them