

Chapter 8 Review

As taught by Ms. Tracey Pannapara, 2017-18 Term

Chemistry Lecture Notes

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1. Translate word equation to formula equation

2. Four signs of a chemical reaction:

- (a) Energy released (heat or light)
- (b) Color change
- (c) Evolution of gas
- (d) Formation of precipitate

3. Symbols in chemical reactions (p. 258 in text):

Symbol	Explanation
\longrightarrow	"Yields"; result of reaction
\rightleftharpoons	Reversible reaction
(s)	Solid or precipitate
\downarrow	Precipitate
(l)	Liquid
(aq)	Aqueous solution (dissolved in water)
(g)	Gaseous state
\uparrow	Gaseous product
$\xrightarrow{\Delta}$ or $\xrightarrow{\text{heat}}$	Heat
$\xrightarrow{2 \text{ atm}}$	Pressure of reaction, e.g. 2 atm
$\xrightarrow{\text{pressure}}$	Reaction pressure exceeds normal atmospheric pressure
$\xrightarrow{0^\circ\text{C}}$	Reaction temperature, e.g. 0 °C
$\xrightarrow{\text{MnO}_2}$	Catalyst, e.g. manganese dioxide

4. Seven diatomic elements: $\text{H}_2(\text{g})$, $\text{N}_2(\text{g})$, $\text{O}_2(\text{g})$, $\text{F}_2(\text{g})$, $\text{Cl}_2(\text{g})$, $\text{Br}_2(\text{l})$, $\text{I}_2(\text{s})$

5. Types of reactions:

(a) Synthesis: $\text{A} + \text{B} \longrightarrow \text{AB}$

- i. two elements \rightarrow binary compound (s)
- ii. metal oxide + water \rightarrow metal hydroxide (aq)
- iii. nonmetal oxide + water \rightarrow ternary acid (aq) *not redox
- iv. metal oxide + nonmetal oxide \rightarrow ternary ionic compound (s)

(b) Decomposition: $\text{AB} \longrightarrow \text{A} + \text{B}$

- i. binary compound $\xrightarrow{\Delta} 2$ elements
- ii. metal hydroxide $\xrightarrow{\Delta}$ metal oxide (s) + steam
- iii. metal chlorate $\xrightarrow{\Delta}$ metal chloride (s) + $\text{O}_2(\text{g})$
- iv. metal carbonate $\xrightarrow{\Delta}$ metal oxide (s) + $\text{CO}_2(\text{g})$
- v. $\text{H}_2\text{CO}_3(\text{aq}) \longrightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ and $\text{H}_2\text{SO}_3(\text{aq}) \longrightarrow \text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

(c) Single replacement: $\text{AX} + \text{B} \longrightarrow \text{BX} + \text{A}$ or $\text{AY} + \text{X} \longrightarrow \text{AX} + \text{Y}$

- i. More active metal replaces less active metal
- ii. More active metal replaces H in acid

Metal	Activity	Halogen	Activity
Li		F ₂	
Rb	React with cold H ₂ O (metal hydroxide) and acids, replacing hydrogen. React with oxygen, forming oxides.	Cl ₂	Replace lower activity halogens, going down periodic table
K		Br ₂	
Ba		I ₂	
Sr			
Ca			
Na			
Mg	React with steam (but not cold water; metal oxide) and acids, replacing hydrogen. React with oxygen, forming oxides.		
Al			
Mn			
Zn			
Cr			
Fe			
Cd			
Co	Do not react with water. React with acids, replacing hydrogen.		
Ni			
Sn			
Pb			
H ₂	React with oxygen, forming oxides		
Sb			
Bi			
Cu			
Hg			
Ag	Fairly unreactive, forming oxides only indirectly		
Pt			
Au			

(p. 278 in text)

- iii. More active metal replaces H in H₂O (sheet says it all; note hydroxide vs oxide)
 - iv. Halogens
 - (d) Double replacement: $AX + BY \longrightarrow AY + BX$
 - i. Translate from words to formulas
 - ii. Watch for precipitate, gas, or molecular compound (particularly H₂O)
 - (e) Combustion: something + O₂(g)
 - i. hydrocarbon + O₂(g) \longrightarrow CO₂(g) + H₂O(g)
6. Oxidation numbers
- (a) Assign to elements based on rules:
 - i. Atoms in pure elements hav oxidation number of 0
 - ii. For binary molecular, assign most electronegative and then solve for other
 - iii. F is always -1, since it is most electronegative
 - iv. H is +1 with nonmetals and -1 with metals
 - v. O usually -2, except when with F or H (peroxides)
 - vi. Sum of all oxidation numbers = overall charge (0 for a neutral compound)
 - vii. For ionic compounds, charge of each ion is oxidation number
 - (b) Name binary molecular compounds without prefixes