The Automatic Professor Teaches you about:

6.1 Types of Chemical Reactions

Instructions: Fill in the notes while you watch the video. Make headings, skip lines between topics, and underline headings. Use color to help your brain learn.

C4.4 I can identify, give evidence for, predict products of, and classify the flowing types of chemical reactions: synthesis (combination), decomposition, single and double replacement, neutralization (acid-base), combustion.

Classifying chemical reactions makes it easier to predict the products of reactions and recognize the new reactions. There are 6 common types of chemical reactions:

1. **SYNTHESIS (COMBINATION) REACTION** - _____ or more reactants (A and B) combine to produce a _____ product (AB). (The letters A and B represent elements.)

General Equation	A + B → AB
Example Equation (ionic)	$2Na + Cl_2 \rightarrow 2NaCl$
Example Equation (covalent)	$2N_2 + O_2 \rightarrow 2N_2O$

Try the Practice Problems on page 259.

2. **DECOMPOSITION REACTIONS** – The breaking down of a _____ into smaller compounds or _____ elements. Reverse of a synthesis reaction.

General Equation	AB → A + B
Example Equation	$2NaCl \rightarrow 2Na + Cl_2$
Example Equation	$2H2O \rightarrow 2H_2 + O_2$

Try the Practice Problems on page 260.

3. **SINGLE REPLACEMENT REACTIONS** – A reactive _____ (a metal or non-metal) and a _____ react to produce another element and another compound. (One of the elements in the compound is _____ by another element.)

General Equations	A + BC → B + AC (A is a metal) A + BC → C + BA (A is a non-metal)

Example Equation (A is a metal)	$2Al + 3CuCl_2 \rightarrow 3Cu + 2AlCl_3$
Example Equation (A is a metal)	$Cu + 2AgNO_3 \rightarrow 2Ag + Cu(NO_3)_2$
Example Equation (A is a non-metal)	$F2 + 2NaI \rightarrow I_2 + 2NaF$

Try the Practice Problems on page 261.

4. **DOUBLE REPLACEMENT REACTIONS** – Two ionic _____ react to produce two other ionic compounds. At least one of the compounds produces a _____.

General Equation	$AB_{(aq)} + CD_{(aq)} \rightarrow AD_{(aq)} + CB_{(s)}$
Example Equation	$Pb(NO_3)_2 + 2NaI \rightarrow 2NaNO_3 + PbI_2$
Example Equation	$3NaOH + FeCl_3 \rightarrow 3NaCl + Fe(OH)_3$

Try the Practice Problems on page 262.

5. **NEUTRALIZATION REACTIONS** – An acid and base combine and _____ each other. An acid and a base react to form a _____ and _____.

General Equation (X is a negative ion.) (M is s a positive ion.)	Acid + Base → Salt + Water $HX + MOH \rightarrow MX + H_2O$
Example Equation	$H_2(SO_4) + Ca(OH)_2 \rightarrow CaSO_4 + 2H_2O$
Example Equation	$3H_3PO_4 + 3Fe(OH)_2 \rightarrow Fe_3(PO_4)_2 + 6H_2O$

Try the Practice Problems on page 263.

6. **COMBUSTION REACTIONS** – A _____ reaction of a compound or element react with _____ to form an oxide and to produce heat.

General Equation	Hydrocarbon + oxygen → carbon dioxide + Water $C_XH_Y + O_2 \rightarrow CO_2 + H_2O$
Example Equation	$CH4 + 2O_2 \rightarrow CO_2 + 2H_2O$
Example Equation	$3C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$
Example Equation	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Try the Practice Problems on page 264. Then try the Summary Practice Problems p. 265.