Celebration Practice

Chemical Reactions

there are 5 types…

Synthesis

Decomposition

Single Replacement

Double Replacement

Combustion

Synthesis

Describe, and 2 example reactions:

2 or more smaller chemical substances combine into a new, larger compound.

Hydrogen gas and oxygen gas combine into water.

$$2P_{(S)} + 5F_{2(G)} \longrightarrow 2PF_{5(G)}$$

Decomposition

Describe, and 2 example reactions:

One larger chemical compound breaking up into 2 or more smaller substances.

$$2NH_{3(G)} \longrightarrow 3H_{2(G)} + N_{2(G)}$$

$$2H_2O_{2(AQ)} \longrightarrow 2H_2O_{(L)} + O_{2(G)}$$

Single Replacement

Describe, and 2 example reactions:

An atom bumps out one ion from an aqueous solution. Table J is used for these.

$$Mg_{(S)} + 2HCl_{(AQ)} \longrightarrow MgCl_{2(AQ)} + H_{2(G)}$$

The Mg bumps out the H^{+1} & forms Mg^{+2} ion in solution

$$NaOH_{(AQ)} + Li_{(S)} \longrightarrow LiOH_{(AQ)} + Na_{(S)}$$

The Li bumps out the Na^{+1} & forms Li^{+1} ion in solution

$$Ag_{(S)} + HCl_{(AQ)} \longrightarrow X \quad \text{no reaction}$$

The Ag <u>cannot</u> bump out the H^{+1} ion from solution

Double Replacement

Describe, and 2 example reactions:

You must start with
2 AQUEOUS SOLUTIONS,
the cations switch anions with each other. Use Table F to determine solubility in water.

Ammonium chromate and barium nitrate solutions react and form ammonium nitrate solution and barium chromate precipitate

According to Table F, both ionic compounds in the reactants are soluble, or will dissolve in water (aqueous).

Only one product, ammonium nitrate, is aqueous.
The other product, the barium chromate, is insoluble;
insoluble means it will form a precipitate in water.

Combustion
Describe, and 2 example reactions:

A hydrocarbon (any molecule of just hydrogen and carbon - in any ratio) combines rapidly with oxygen, releasing carbon dioxide, water, and lots of energy.

Butane combusts…

$$2C_4H_{10(G)} + 13O_{2(G)} \longrightarrow 8CO_{2(G)} + 10H_{2(G)}$$

Octane combusts too…

$$2C_8H_{18(L)} + 25O_{2(G)} \longrightarrow 16CO_{2(G)} + 18H_2O_{(G)}$$

The only products of combustion are water and carbon dioxide.
Any hydrocarbon will do, balance slowly.

Name this reaction… answers on next slide

balanced reaction (no phases)	type of reaction
$H_3PO_4 + 3KOH \longrightarrow K_3PO_4 + 3H_2O$	
$H_2 + O_2 \longrightarrow H_2O_2$	
$C_{10}H_{22} + 31O_2 \longrightarrow 20CO_2 + 22H_2O$	
$3Li + AlCl_3 \longrightarrow 3LiCl + Al$	
$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$	
$Ti + NiSO_4 \longrightarrow TiSO_4 + Ni$	
$Al(OH)_3 + 3HBr \longrightarrow AlBr_3 + 3H_2O$	
$3Rb + P \longrightarrow Rb_3P$	

Name this reaction…
answers

balanced reaction	type of reaction
$H_3PO_4 + 3KOH \longrightarrow K_3PO_4 + 3H_2O$	double replacement
$H_2 + O_2 \longrightarrow H_2O_2$	synthesis
$C_{10}H_{22} + 31O_2 \longrightarrow 20CO_2 + 22H_2O$	combustion
$3Li + AlCl_3 \longrightarrow 3LiCl + Al$	synthesis
$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$	decomposition
$Ti + NiSO_4 \longrightarrow TiSO_4 + Ni$	single replacement
$Al(OH)_3 + 3HBr \longrightarrow AlBr_3 + 3H_2O$	double replacement
$3Rb + P \longrightarrow Rb_3P$	synthesis

How to prepare for Friday…

Know 5 types of chemical reactions by name, know how to write the abstractions of these five reactions, know a real example reaction both as a word equation as well as a balanced chemical reaction.

Know the difference between coefficients, which you can change in balancing reactions, from subscripts, which you can't change once you write the compound correctly.

Know TOPIC-B, tests for gases in the lab, and how to use both Table J and Table F. Know when to use them too.

Know your vocabulary, aqueous, endothermic vs. exothermic, cation, anion, atom, phases, soluble, insoluble, synthesis, decomposition, combustion, single and double replacement, precipitate.

Know why some single replacement reactions DO NOT occur.

Know why chromium makes three different oxides, what the formulas and names for these three oxides are. (see next slide)

Chromium makes 3 different cations, +2, +3, and +6 as shown on your periodic table of elements.

Chromium II oxide is CrO - (in a 1:1 ratio)
this chromium ion is Cr^{+2}

Chromium III oxide Cr_2O_3 - (in a 2:3 ratio)
this chromium ion is Cr^{+3}

Chromium VI oxide CrO_3 - (in a 1:3 ratio)
this chromium ion is Cr^{+6}

The Roman Numeral matches the number of electrons lost by that particular cation.