Year 10 Chemical Science Part 2
Revision – Chemical Reactions

Acids and Bases

1. Complete the following paragraphs

Acids are substances that contain hydrogen and when dissolved in water they release hydrogen ions (H^+). For example, HCl forms the H^+ and the Cl^- ions.

The pH is a measure of the acidity of a substance and pH stands for potential hydrogen. Acidic substances have a pH less than 7 and greater than or equal to 1.

A Base is a substance that releases the hydroxide ion (OH^-) when dissolved in water. A base that is dissolved in water is called an alkali. Metal hydroxides such as sodium hydroxide (NaOH) and metal oxides such as magnesium oxide (MgO) are bases as they release OH^- ions in solution.

Acid Reactions

2. Complete the following general acid reactions

Acid + base → salt + water

Acid + metal → salt + hydrogen gas

Acid + metal carbonate → salt + carbon dioxide + water

Acid + metal hydrogen carbonate → metal carbonate + carbon dioxide + water

3. Complete the following table

Acid	Chemical formula	Ions present	Type of Salt formed
Hydrochloric	HCl	H^+, Cl^-	chloride
Sulfuric	H_2SO_4	H^+, SO_4^{2-}	sulfate
Nitric	HNO_3	H^+, NO_3^-	nitrate
Ethanoic (acetic)	CH_3COOH	H^+, CH_3COO^-	ethanoate (acetate)
Phosphoric	H_3PO_4	H^+, PO_4^{3-}	phosphate
Carbonic	H_2CO_3	H^+, CO_3^{2-}	carbonate

Decomposition Reactions

4. Complete the sentence and general reactions below.

When metal carbonates and metal hydrogen carbonates are heated they decompose.

Metal hydrogen carbonate $\xrightarrow{heat}$ metal carbonate + water + carbon dioxide

Metal carbonate $\xrightarrow{heat}$ metal oxide + carbon dioxide

Balancing Equations

5. Balance the following equations

_____C_3H_8 + _5_ O_2 → _3_ CO_2 + _4_ H_2O

3 C ✗ 3
8 H ✗ 8
10 ✗ O 8 ✗ 10

_2_ Al + _6_ HCl → _2_ $AlCl_3$ + _3_ H_2

2 ✗ Al ✗ 2
6 ✗ H ✗ 6
6 ✗ Cl 3 6

_3_ $Ca(OH)_2$ + _2_ H_3PO_4 → _____ $Ca_3(PO_4)_2$ + _6_ H_2O

3 ✗ Ca 3
14 ~~16~~ 6 O ✗ 14
12 ~~9~~ ~~8~~ H ✗ 12
2 ✗ P 2

6. Write balanced chemical equations from the following word equations

Ammonium carbonate + nitric acid → ammonium nitrate + carbon dioxide + water

$(NH_4)_2CO_3 + 2HNO_3 \rightarrow 2NH_4NO_3 + CO_2 + H_2O$

Sodium + sulfuric acid → sodium sulfate + hydrogen gas

$2Na + H_2SO_4 \rightarrow Na_2SO_4 + H_2$

Zinc carbonate $\xrightarrow{heat}$ zinc oxide + carbon dioxide

$ZnCO_3 \rightarrow ZnO + CO_2$

7. Predict the products and write balanced chemical equations from the given reactants

Hydrochloric acid and zinc → hydrogen gas and zinc chloride.

$2HCl + Zn \rightarrow ZnCl_2 + H_2$

Sodium carbonate and hydrochloric acid → sodium chloride, carbon dioxide and water

$Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$

Magnesium hydrogen carbonate is heated → magnesium carbonate, water and carbon dioxide.

$Mg(HCO_3)_2 \xrightarrow{heat} MgCO_3 + H_2O + CO_2$

8. Predict the reactants and write balanced chemical equations from the following products.

→ calcium chloride and water

$Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$

→ copper (II) phosphate and hydrogen gas

$2H_3PO_4 + 3Cu \rightarrow Cu_3(PO_4)_2 + 3H_2$

→ zinc ethanoate and carbon dioxide and water

$2CH_3COOH + ZnCO_3 \rightarrow Zn(CH_3COO)_2 + CO_2 + H_2O$