

NATIONAL 4 CHEMISTRY

SUMMARY NOTES

Unit One: Chemical Changes and Structure

7. Acids & Alkalis

pH Scale

pH is measured using Universal indicator, pH paper or a pH meter. The scale can go from -1 to 15 but most substances lie between 1 and 14.

Acids have a $\text{pH} < 7$

Alkalis have a $\text{pH} > 7$

Neutral substances have a $\text{pH} = 7$.

Soluble **metal oxide** form **alkalis**.

Soluble **non-metal** oxides form **acids**.

All fizzy drinks are acidic because of the carbon dioxide gas dissolved in them. Most fruit-based drinks are also acidic.

Vitamin C is an acid and benzoic acid is added to foods as a preservative.

Most cleaning compounds tend to be alkaline.

Effect of Dilution

Diluting an acid increases its pH towards 7.

Diluting an alkali decreases its pH towards 7.

Diluting both reduces their electrical conductivity.

8. Salt Preparation

Reactions of Acids

Neutralisation reaction: moves the pH of an acid to 7, producing water.

Base: a substance which neutralises an acid.

Alkali: a soluble base.

Salt: ionic compound formed from the negative ion of the acid and the positive ion from the neutraliser (usually metal).

Acid	Type of salt
Hydrochloric	... chloride
Nitric	... nitrate
Sulphuric	... sulphate
Ethanoic	... ethanoate

1. acid + alkali (metal hydroxide) → salt + water
 2. acid + metal oxide → salt + water
 3. acid + metal carbonate → salt + water + carbon dioxide
 4. acid + metal (MAZINTL) → salt + hydrogen
- 1 → 3 are neutralisations, while 4 is a displacement.

This means metal hydroxides, metal oxides and metal carbonates are **bases**.

Acid rain is caused by:

- **sulphur dioxide** (from burning fossil fuels)
- **nitrogen dioxide** (from sparking of air in a car engine or lightning storms)
- **carbon dioxide** (to a lesser extent)

This damages buildings and structures made of metal carbonate rock or iron and steel (which rust faster). It also affects plants and animals living around rivers and lakes which are acidic (killing plants and leading to death of fish and animals).

Farmers use **lime** to neutralise the effects of acid rain on soils and lakes.

Toothpastes are **alkaline** to neutralise the acid produced by plaque and the acid of fizzy and fruit drinks.