Be REFLECTIVE: Review your learning

KNOWLEDGE ORGANISER
CHEMISTRY: ACIDS AND ALKALI

Name:

Section 1: Acids and alkalis Key Terms

Chemical reaction	A change in which atoms are rearranged to create new substances.
Reversible	A change in which it is possible to get back to the original substances.
Physical change	A change that is **reversible**, in which new substances are **not** made.
Acid	A solution with a pH value of **less than 7**.
Alkali	An alkali is a **soluble base**.
Base	A substance that neutralises an acid.
Corrosive	A substance is corrosive if it can burn your skin or eyes.
Irritant	A substance that makes your skin itch or swell up a little.
Concentrated	A solution is concentrated if it has a large number of solute particles per unit volume.
Dilute	A solution is dilute if it has a small number of solute particles per unit volume.
Indicator	Substance used to identify whether unknown substances are acidic or alkaline.
Litmus	An indicator that changes colour upon addition of acid or alkali.
Universal indicator	An indicator that changes colour upon addition of acid or alkali (shows the pH of a solution).
pH scale	Shows whether a substance is acidic, neutral or alkaline.
Neutral	An object or particle that has no charge
Strong acid	An acid in which all of its particles have split up when it dissolves in water.
Weak acid	An acid in which only some of the acid particles split up when it dissolves in water.
Neutralisation	In a neutralisation reaction, an acid cancels out a base (or vice versa).
Salt	A compound in which the hydrogen atoms of an acid are replaced by atoms of a metal element.

Section 2: Chemical reactions

Chemical reactions involve a change where atoms are rearranged to create new substances. They are **not** easily **reversible**. They also **transfer energy** to or from the surroundings.

Chemical reactions are useful because they make many useful substances like medicines, fabrics and building materials.

Not all changes involve chemical reactions. Changes of state and dissolving are reversible but do not result in new substances being made. These are examples of **physical changes**.

Section 3: Acids and alkalis

When handling acids and alkalis in the lab, we need to take into account any safety precautions.

You can wear goggles to protect your eyes, and gloves to keep solutions off your skin.

Concentrated acids are corrosive. If an acid is dilute (lots of water added) then it will be an irritant.

corrosive irritant

The hazards depend upon the acid/alkali you use and whether the solution is concentrated or dilute.

Section 4: Indicators and pH

You can use an indicator to find out whether a solution is acidic or alkaline. The dye turns a different colour in acidic and alkaline conditions.

Indicators	Colour in dilute hydrochloric acid	Colour in dilute sodium hydroxide
Juice extracted from red cabbage	Red	Yellow/green
Juice extracted from Beetroot	Red/purple	yellow
Red Litmus	Red	blue
Blue litmus	Red	blue

Universal indicator changes colour upon addition of acid or alkali. A pH of less than 7 is acidic, the lower the pH the more acidic the solution. A pH of 7 is neutral. Above 7 is alkaline and the higher the pH the more alkaline it is.

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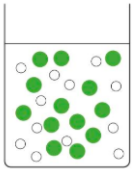
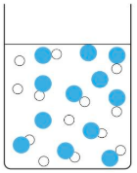
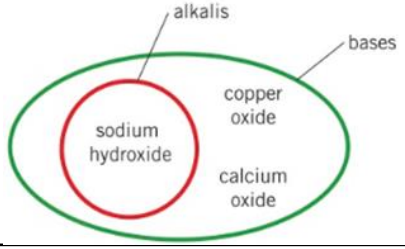
Section 5: Acid strength

Hydrochloric acid, sulphuric acid and nitric acid are **strong acids** because all of their particles split up when dissolve in water.	all particles have split up 
Citric acid (in lemons) and Ethanoic acid (present in vinegar) are **weak acids** because only some of their particles split up.	Only some of the particles have split up 
Concentration is the amount of acid dissolved in water to make 1 litre of solution. It's a measure of the number of particles in a given volume of solution.	More concentrated solutions of acids have lower pH Less concentrated solutions have higher pH. If the concentration is the same, then strong acids will have a lower pH than weaker acids.

Section 6: Neutralisaton

When an acid reacts with an alkali, a neutralisation reaction occurs. The acid has cancelled out the alkali and the pH is 7.

A **base** is a substance that **neutralises an acid**. Some bases dissolve in water. A **soluble base** is called an **alkali**.	
How is neutralisation **useful**?	Neutralising acidic crops (creates suitable conditions for growing crops like tea.) Neutralise acidic lakes

Section 7: Making salts

When a neutralisation reaction happens a **salt** is made

A salt is a substance that forms in the chemical reaction of an acid with:
- A metal
- a suitable metal, metal carbonate, metal oxide or metal hydroxide is reacted with acid

With metal	Acid + Metal → **Salt** + Hydrogen Hydrochloric acid + magnesium → **magnesium chloride** + hydrogen
With alkali	Acid + Metal Hydroxide → **Salt** + Water Hydrochloric acid + sodium hydroxide → **sodium chloride** + water
With a base (metal oxide)	Acid + Metal Oxide → **Salt** + Water Sulfuric acid + copper oxide → **copper sulfate** + water

Section 8: Making crystals of salts

Crystals of salt are made by removing water from salt solutions using filtration and evaporation.

Crystallisation

Pure dry crystals can be obtained from solution by:
- **Add solid** metal, metal oxide or metal hydroxide **to an acid**.
- Add solid **until no more reacts**.
- **Filter** off excess unreacted solid.
- **Evaporate** to remove some of the water.
- Leave to **crystallise in an evaporating basin**.
- Filter the crystals and leave to dry in air.