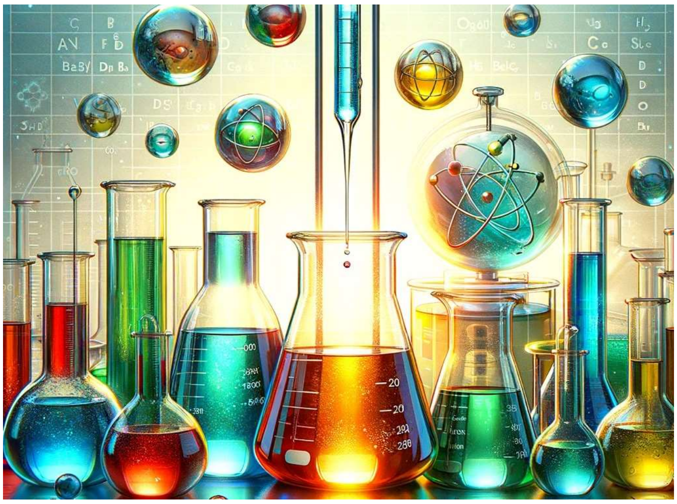
Master

Kirkcaldy High School



N4/5 Chemistry

Unit 1 - part 6

Acids and Bases

Name: ______________________

Class: ______________________

Teacher: ______________________

Assessment Page

End of topic questions

Topic title	Date	Mark/Total Mark
		/
		/
		/
		/
		/
		/
		/
		/
		/
		/

Homework

Homework title	Date	Mark/Total Mark
		/
		/
		/

Check tests

Test title	Date	Mark/Total Mark
		/

Teacher comments

Date: ________________

The pH Scale

Learning Intentions

- To learn about the pH scale and how to measure it.

Success Criteria

☐ I can identify acidic, neutral and basic(alkaline) solutions based on their pH.

☐ I can state why indicators are used.

☐ I can determine the pH of a solution with universal indicator.

The pH Scale

The pH scale is a number scale from **0** to **14** that tells us how **acidic**, **basic** (also called alkaline*), or **neutral** a solution is:

- **Acidic Solutions:** These have a pH from 0 to **less** than 7. The lower the number, the more acidic the solution.
- **Basic (Alkaline) Solutions:** These have a pH **greater** than 7 up to 14. The higher the number, the more basic the solution.
- **Neutral Solutions:** A pH of **exactly** 7 is neutral, meaning it's neither acidic nor basic.

Fill in the table below if the solution will be acidic, basic(alkaline) or neutral

pH of Solution	Acidic, neutral or basic?
2.5	
8.0	
6.5	
9.2	
3.8	
7.0	
11.3	
1.0	
7.5	

*alkaline and basic are different concepts but they are often used interchangeably, we will define acid and alkaline in a future lesson.

Indicators

Many solutions look just like water: **clear** and **colourless**. It's hard to tell them apart just by looking. This is where indicators are useful.

Indicators are special chemicals that **change colour** when added to a solution. This colour **change** shows us if the solution is **acidic,** neutral or **basic**. For example, a common indicator called **litmus** turns **red** in acidic solutions and **blue** in basic solutions.

Some fruit and vegetables can act as indicators such as red cabbage and beetroot. These are called **natural indicators**.

Indicators experiment (lab book page 20)

Complete the table below to show the colour each indicator goes when acid and basic(alkaline) solutions are added to it are added to it.

	Indicator Colour	**Colour in Acidic Solutions**	**Colour in Basic (Alkaline) Solutions**
Phenolphthalein			
Bromothymol blue			
Litmus			
Methyl orange			
pH paper			

After experimenting with various indicators, consider their effectiveness. What characteristics do you think make a good indicator?

____

____

____

____

Universal Indicator

All of the indicators we have used demonstrate varied effectiveness in detecting pH levels.

To pinpoint the exact pH value on the scale, a **universal indicator** is ideal. A universal indicator is created by **blending** various individual indicators, resulting in a solution that can display a wide **range** of colours, each corresponding to a **specific** pH level. This allows for a more **precise** determination of the **pH** value of a solution.

Colour in the scale below to represent the changes in colour observed at different pH levels when using a universal indicator. Label the acidic, neutral and basic(alkaline) regions. Your teacher will show you this.

Observed Colours with Universal Indicator

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**

Fill in the table below with the colour shown with universal indicator. Either write the colours name or use a coloured pencil/pen.

pH of Solution	Colour Observed with Universal indicator
2	
8	
6	
9	
3	
7	
11	
1	
7	
5	

Reaction Title: pH of everyday substances (lab book page 20)

Aim: ____

____

Method:

Results:

Chemical	Colour with Universal Indicator	pH (1 – 14)	Acid, Neutral or Basic(alkaline)
Vinegar			
Water			
Washing Soda			
Soap Solution			
Citric Acid			
Sodium Chloride			
Sodium Carbonate			

Conclusion: ____

____

____

Evaluation: ____

____

____

Reaction Title: **Natural Indicators (optional)**

Aim: ____

____

Method:

Results:

Conclusion: ____

____

____

Evaluation: ____

____

____

Date: ________________

Acids, Alkalis and Ions

Learning Intentions

- To learn about the ions involved in acidic and basic(alkaline) solutions.

Success Criteria

☐ I can state what ions water dissociates into.

☐ I can identify reversible reactions.

☐ I can determine the relative H^+ and OH^- ion concentrations in an acidic, neutral and basic(alkaline) solution.

☐ I can identify common laboratory acids and bases.

Dissociation of Water and Reversible Reactions

Water, a simple yet vital molecule, undergoes a fascinating chemical process known as dissociation. In this process, water molecules (H_2O) naturally break down into **hydrogen** ions (**H^+**) and **hydroxide** ions (**OH^-**). This dissociation is an example of a reversible reaction. Reversible reactions are shown by the symbol " ⇌ ".

Dissociation of water reaction:

$$H_2O(l) \rightleftharpoons H^+(aq) + OH^-(aq)$$

Questions

1. **State** the definition of the word dissociation.

   ____

   ____

2. **State** what is meant by the symbol " ⇌ ".

   ____

3. **Challenge**: Water molecules are covalent molecular (a non-conductive substance) and yet water is conductive. **Explain** the reason behind water's conductive properties.

   ____

   ____

   ____

   ____

The pH Scale and H^+ and OH^- ions

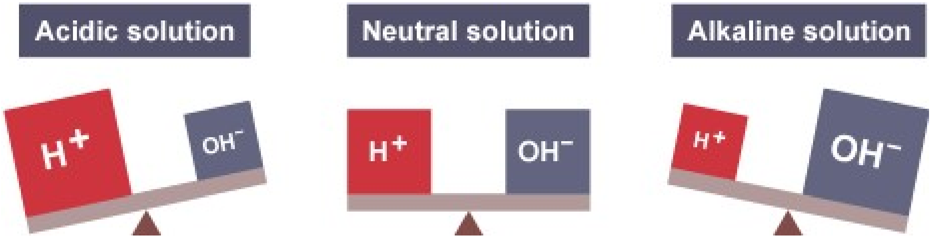
As discussed previously, the pH scale ranges from 0 to 14. It's a measure of how acidic or basic a water-based solution is.

The key to this scale is the concentration of hydrogen ions (H^+) and hydroxide ions (OH^-) in a solution.

- **Acidic Solutions:** These have a pH less than 7.
  In such solutions, the concentration of **hydrogen** ions (H^+) is **greater** than that of **hydroxide** ions (OH^-).

- **Basic (Alkaline) Solutions:** These have a pH **greater** than 7. Here, the concentration of hydroxide ions (OH^-) is greater than that of hydrogen ions (H^+).

- **Neutral Solutions:** A pH of exactly **7** is neutral, which means the concentrations of H^+ and OH^- ions are **equal**. **Pure** water is a prime example of a **neutral** solution.



Fill in the table below for the relative concentrations of H^+ and OH^- ions.

pH of Solution	Relative Concentration of H+ and OH- ions
8	*Greater H^+ ions than OH^- ions*
4	
7	
3	
7	
11	
1	
6	
5	
2	

Common laboratory Acids and Bases

certain acids and bases are frequently encountered due to their essential roles in various chemical reactions and experiments. Understanding these common substances, their properties, and their chemical formulae is fundamental for anyone working in a lab.

Common Laboratory Acids

Acid Name	Chemical Formula	Ionic Formula
Hydrochloric Acid	**HCl**	**H^+Cl^-**
Nitric Acid	**HNO_3**	**H^+NO^{3-}**
Sulfuric Acid	**H_2SO_4**	**$H^+{}_2SO_4{}^{2-}$**
Phosphoric Acid	**H_3PO_4**	**$H^+{}_3PO_4{}^{3-}$**

Common Laboratory Bases

Base Name	Chemical Formula	Ionic Formula
Sodium Hydroxide	**$NaOH$**	**$NaOH^-$**
Potassium Hydroxide	**KOH**	**KOH^-**
Ammonia	**NH_3**	**NH_3**
Calcium Hydroxide	**$Ca(OH)_2$**	**$Ca^{2+}(OH^-)_2$**
Magnesium Hydroxide	**$Mg(OH)_2$**	**$Mg^{2+}(OH^-)_2$**

Questions

1. **Identify** the ion released by hydrochloric acid (HCl) that makes it acidic.

____

____

2. **Explain** why sodium hydroxide ($NaOH$) is a base based on its ions.

____

____

3. **Compare** the acid strengths of nitric acid (HNO_3) sulfuric acid (H_2SO_4) and phosphoric acid (H_3PO_4) based on their ionization.

____

____

Date: ________________

Neutralisation and Dilution

Learning Intentions

- To learn about the effect of neutralisation and dilution on the pH of a solution.

Success Criteria

- ☐ I can determine the effect neutralisation and dilution on the pH of a solution.
- ☐ I can determine the effect neutralisation and dilution on the H^+ and OH^- ions of a solution.

Neutralisation

A **neutralisation** reaction occurs when an **acidic** solution and **basic** solution are **mixed**. This results in the pH of the solution moving **towards 7** (neutral).

In neutralization, the pH of an acidic solution (originally **below** 7) will **increase**, moving closer to 7.

- This leads to a **decrease** in the concentration of H^+ ions and an **increase** in the concentration of OH^- ions.

Conversely, the pH of a basic solution (originally **above** 7) will **decrease**, also moving towards 7.

- This leads to an **increase** in the concentration of H^+ ions and a **decrease** in the concentration of OH^- ions.

The pH change is a direct result of the interaction between the hydrogen ions (H^+) and hydroxide ions (OH^-) in the solutions, leading towards a more balanced, neutral state. The H^+ and OH^- ions react to from H_2O (water):

$$H^+ (aq) + OH^- (aq) \rightarrow H_2O (l)$$

Neutralisation Experiment (lab book page 22)

Method:

1. Use a measuring cylinder to measure 10 cm^3 acid into a clean small beaker.
2. Add a few drops of universal indicator and note the colour and pH in your table.
3. Rinse the measuring cylinder with water.
4. Add 1 cm^3 alkali to the beaker.
5. Note the colour and pH in your table.
6. Add another 1 cm^3 alkali and note result.
7. Repeat until you have added 9 cm^3.
8. Now use a dropper and add alkali drop by drop until the solution turns green.
9. Note the final volume of alkali used.

Volume of Base(Alkali) Added (cm^3)	Colour of Solution	pH
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Final volume of alkali used: _______________

Dilution and pH Changes

Dilution is the process of adding **water (solvent)** to a solution.

In dilution, the concentration of an acidic or basic solution is reduced, leading to changes in pH levels. This process involves adding more solvent (typically water) to a solution, which affects the concentration of H^+ ions in acids and OH^- ions in bases.

- For an acidic solution (initially with pH **below** 7), dilution leads to a **decrease** in the concentration of H^+ ions. As a result, the pH of the solution **increases**, moving **closer** to 7.
- In contrast, for a basic solution (initially with pH **above** 7), dilution results in a **decrease** in the concentration of OH^- ions. Consequently, the pH of the solution **decreases**, also moving **towards** 7.

The change in pH during dilution is the outcome of altering the concentrations of hydrogen ions (H^+) and hydroxide ions (OH^-) in the solution.

Unlike neutralization, where H^+ and OH^- ions react to form water, dilution simply involves a reduction in the concentration of these ions due to the addition of more solvent.

Dilution Experiment (lab book page 21)

Follow the method in page 21 of the lab book then draw, label and colour in your apparatus at the end of the experiment below.

Fill in the table below.

Initial pH of Solution	Action Taken (Acid/Base/Water Added)	pH Change (Increase/ Decrease/ Stay the Same)	Effect on H+ Ion Conc.	Effect on OH- Ion Conc.
4	Acid Added	*Decrease*	*Increase*	*decrease*
8	Base Added			
3	Water Added			
7	Acid Added			
9	Water Added			
5	Base Added			
2	Water Added			
10	Acid Added			
6	Base Added			
7	Water Added			
3	Base Added			
11	Water Added			
4	Acid Added			
5	Water Added			
2	Base Added			
9	Acid Added			
8	Water Added			
6	Acid Added			
7	Base Added			

Date: _______________

Bases, Oxides and Neutralisation Reactions

Learning Intentions

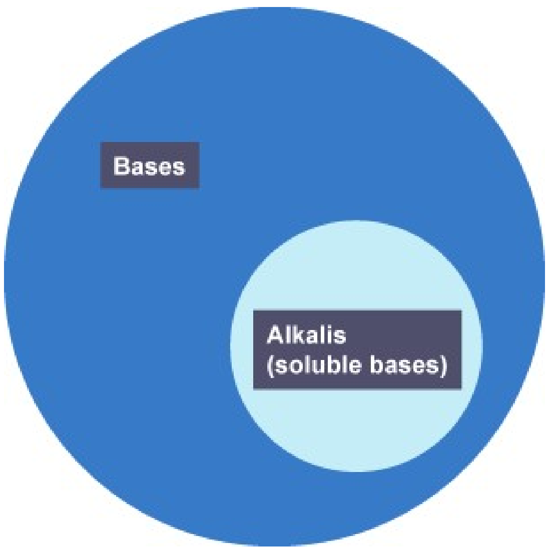
- To learn about bases and their reactions with acids.

Success Criteria

- ☐ I can state the definition of a base.
- ☐ I can state the 3 main examples of a base and use the solubility table to determine if they are bases.
- ☐ I can state the definition of a neutralisation reaction.
- ☐ I can identify the salt in a neutralisation reaction.
- ☐ I can name the salt given the acid and base in a neutralisation reaction.
- ☐ I can write the balanced chemical/ionic equation for a neutralisation reaction.

Bases

In the context of aqueous solutions, a **base** is defined as a substance that dissolves in water to produce an **alkaline** solution. So soluble bases form alkaline solutions.



This alkalinity is characterized by a pH greater than 7. When bases dissolve in water, they release hydroxide ions (OH^-), which are responsible for the basic, or alkaline, nature of the solution.

Examples of bases

> General examples of bases are soluble metal **oxides**, metal **hydroxides** and metal **carbonates**.

The solubility of these substances can be found on page 8 of the data booklet. You match the metals from the rows to the non-metal ions in the columns. If it says s or vs it means it is soluble. <u>Ignore ammonium as it is a non-metal group ion.</u>

vs	means very soluble	(a solubility greater than 10 g l^{-1})
s	means soluble	(a solubility of between 1 and 10 g l^{-1})
i	means insoluble	(a solubility of less than 1 g l^{-1})
–	no data	

	bromide	carbonate	chloride	iodide	nitrate	phosphate	sulfate	oxide	hydroxide
aluminium	vs	–	vs	vs	vs	i	vs	i	i
~~ammonium~~	vs	vs	vs	vs	vs	vs	vs	–	–
barium	vs	i	vs	vs	vs	i	i	vs	vs
calcium	vs	i	vs	vs	vs	i	s	s	s
copper(II)	vs	i	vs	–	vs	i	vs	i	i

Using your data booklet, give 2 examples of bases from each of the general categories.

Base	Example 1	Example 2
Soluble metal oxide	____________________	____________________
Soluble metal hydroxide	____________________	____________________
Soluble metal carbonate	____________________	____________________

Classify if these substances would be bases or not using your data booklet.

Compound Name	Is it a Base? (Yes/No)
Sodium Chloride ($NaCl$)	
Sodium Hydroxide ($NaOH$)	
Calcium Carbonate ($CaCO_3$)	
Potassium Oxide (K_2O)	
Aluminium Oxide (Al_2O_3)	
Copper(II) Sulfate ($CuSO_4$)	
Zinc Hydroxide ($Zn(OH)_2$)	
Iron(III) Chloride ($FeCl_3$)	
Potassium Carbonate (K_2CO_3)	
Barium Oxide (BaO)	
Magnesium Carbonate ($MgCO_3$)	
Silver Oxide (Ag_2O)	
Lithium Hydroxide ($LiOH$)	
Calcium Sulfate ($CaSO_4$)	

Neutralisation Reactions

A neutralisation reaction is one in which a **base** reacts with an **acid** to form a **salt** and **water**.

e.g. hydrochloric acid + sodium hydroxide → sodium chloride + water

$$HCl + NaOH \rightarrow NaCl + H_2O$$

acid **base** **salt**

The salt's name is derived from the **metal** in the base (like **sodium**) followed by the **non-metal ion** from the acid (like **chloride**), resulting in names such as **Sodium Chloride**.

Remember, a neutralisation reaction causes the pH to approach **7**.

Examples of neutralisation reactions

The word and chemical equations for each type of base going through a neutralisation reaction are below:

1. **Reaction with Metal Oxides:**

magnesium oxide + hydrochloric acid → magnesium chloride + water

Chemical Equation:

$$MgO + 2HCl \rightarrow MgCl_2 + H_2O$$

---

2. **Reaction with Metal Hydroxides:**

Word Equation:

sodium hydroxide + sulfuric acid → sodium sulfate + water

Chemical Equation:

$$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$$

---

3. **Reaction with Metal Carbonates:**

calcium carbonate + nitric acid → calcium nitrate + water + **carbon dioxide**

Chemical Equation:

$$CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + \mathbf{CO_2}$$

Questions

1. **State** the definition of a neutralisation reaction

2. **Identify** the type of base that produces an additional product during neutralization. **State** this additional product.

3. Label the following reactions to show the acid, base and salt:

$$HCl \quad + \quad NaOH \quad \rightarrow \quad NaCl \quad + \quad H_2O$$

$$2NaOH \quad + \quad H_2SO_4 \quad \rightarrow \quad Na_2SO_4 \quad + \quad 2H_2O$$

$$MgO \quad + \quad 2HCl \quad \rightarrow \quad MgCl_2 \quad + \quad H_2O$$

4. **Write** balanced chemical equations for the following reactions:

lithium hydroxide + hydrochloric acid $\rightarrow$ lithium chloride + water

potassium hydroxide + sulfuric acid $\rightarrow$ potassium sulfate + water sodium oxide + nitric acid → sodium nitrate + water

lithium carbonate + hydrochloric acid → lithium chloride + water + carbon dioxide

5. **Complete** the word equation then **write** the balance chemical formula below.

sodium hydroxide + hydrochloric acid → _____________ + _____________

sodium hydroxide + nitric acid → _____________ + _____________

lithium hydroxide + hydrochloride acid → _____________ + _____________

sodium carbonate + hydrochloric acid → _____________ + __________ + _____________

potassium carbonate + sulfuric acid → _____________ + __________ + _____________

Reaction Title: **Neutralisation Reactions (separating the salt formed)**

Aim:

Method:

Results:

Conclusion:

Evaluation:

Date: _______________

Non-metal oxides

Learning Intentions

- To learn about non-metal oxides and the solutions they form.

Success Criteria

☐ I can state the type of solution formed when soluble non-metal oxides dissolved in water.

☐ I can state the names of the gases involved in acid rain.

Soluble non-metal oxides

Soluble non-metal oxides a form **acidic** solutions when **dissolved** in water.

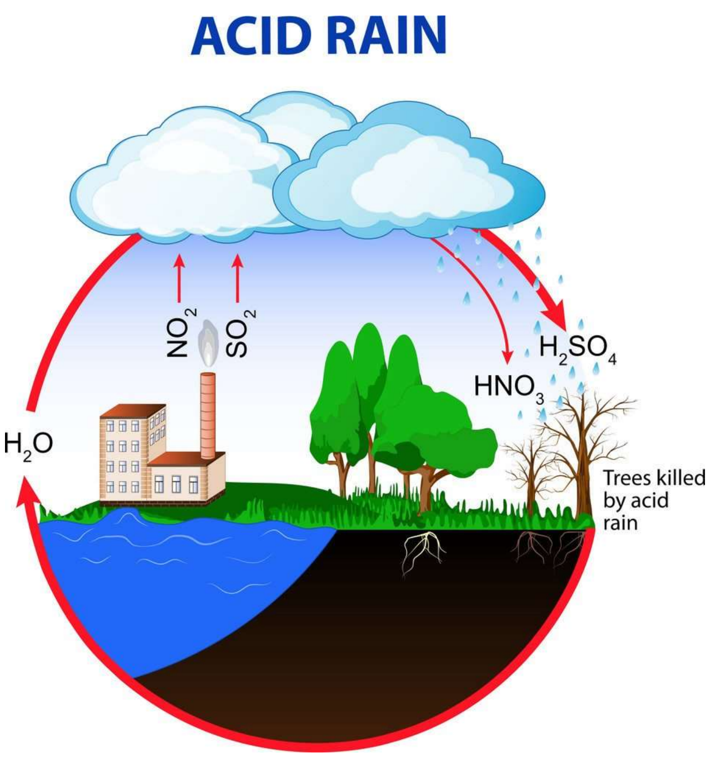
This property is crucial in understanding environmental phenomena like **acid rain**.

Examples of Non-Metal Oxides and Their Reactions:

Carbon Dioxide (CO_2): Reacts with water to form **carbonic** acid (H_2CO_3), a weak acid that contributes to the natural acidity of rainwater.

Nitrogen Dioxide (NO_2): This oxide reacts with water to form a mixture of **nitric** acid (HNO_3) and **nitrous** acid (HNO_2).

Sulfur Dioxide (SO_2): SO_2 in the atmosphere can dissolve in water droplets to form **sulfurous** acid (H_2SO_3). This process significantly contributes to the acidity of rainwater.



List the negative effects of acid rain on the environment.

____

____

____

____

Date: ________________

Spectator Ions

Learning Intentions

- To learn about spectator ions in neutralisation reactions.

Success Criteria

- ☐ I can state the definition of spectator ions.
- ☐ I can identify spectator ions given the full ion equation.
- ☐ I can identify spectator ions given a chemical equation.

Spectator Ions

Spectator ions are ions in a **solution** (must be **aqueous**) that **do not participate** in the chemical reaction and remain **unchanged** throughout the process.

They are **present** in the **reactants** and can be found **unchanged** in the **products** as well.

Identifying spectator ions

1. **Chemical Equation:** Start with the standard chemical equation for the neutralization reaction.

$$NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$$

2. **Ionic Equation:** Next, write the full ionic equation, which breaks down the soluble compounds into their constituent ions. Only **aqueous** (aq) substances break down to soluble components.

Full Ionic Equation:

$$Na^+ + OH^- + H^+ + Cl^- \rightarrow H_2O + Na^+ + Cl^-$$

3. **Identifying Spectator Ions:** Look for ions that appear unchanged on both sides of the ionic equation. These are the spectator ions.

$$Na^+ + OH^- + H^+ + Cl^- \rightarrow H_2O + Na^+ + Cl^-$$

Spectator ions: **Na^+** and **Cl^-**

Equations without spectator ions

Removing the spectator ions from an equation shows only the substances that do change. For neutralisation reactions these will always be as follows:

Equation	Type of base
$2H^+(aq) + O^{2-}(s) \rightarrow H_2O(\ell)$	metal hydroxides
$H^+(aq) + OH^-(aq) \rightarrow H_2O(\ell)$	metal oxides
$2H^+(aq) + CO_3^{2-}(aq) \rightarrow H_2O(\ell) + CO_2(g)$	aqueous metal carbonates
$2H^+(aq) + CO_3^{2-}(s) \rightarrow H_2O(\ell) + CO_2(g)$	insoluble metal carbonates

Identify the spectator ions in the following full ionic equations

1.

$$Na^+ + OH^- + H^+ + Cl^- \rightarrow H_2O + Na^+ + Cl^-$$

Spectator ions: ____________________

2.

$$K^+ + OH^- + H^+ + NO_3^- \rightarrow H_2O + K^+ + NO_3^-$$

Spectator ions: ____________________

3.

$$Ca^{2+} + 2OH^- + 2H^+ + 2Cl^- \rightarrow 2H_2O + Ca^{2+} + 2Cl^-$$

Spectator ions: ____________________

4.

$$Na^+ + OH^- + H^+ + Cl^- \rightarrow H_2O + Na^+ + Cl\text{-}$$

Spectator ions: ____________________

Now identify the spectator ions in the following given the chemical equations. You may use the space provided to write the full ionic equations.

5.

$NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$

Spectator ions: ____________________

6.

$KOH(aq) + HNO_3(aq) \rightarrow KNO_3(aq) + H_2O(l)$

Spectator ions: ____________________

7.

$CaCO_3(aq) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$

Spectator ions: ____________________

Date: ________________

Standard Solutions and Titrations

Learning Intentions

- To learn how to perform a titration.

Success Criteria

- ☐ I can state the definition of standard solution, concordant titre and an indicator in reference to titrations
- ☐ I can state what a titration is used for.
- ☐ I can perform a titration experiment.
- ☐ I can perform a titration calculation.

Standard Solutions

A standard solution is a chemical solution with an **accurately** known concentration.

The **accuracy** of the standard solution's concentration is crucial, as it directly affects the **reliability** of the experimental results obtained through its use.

Titrations

Titrations are a procedure used in chemistry to determine the **concentration** of **unknown** solutions.

This process involves gradually adding a solution of **known** concentration (from a **standard** solution) to a solution of unknown concentration until the reaction between the two solutions is complete at the **end-point**.

The volume of the solution of known concentration is measured and the experiment is repeated multiple times to achieve concordant volumes/titres.

Titre volumes within 0.2 cm^3 are considered **concordant** and an **average** is taken for **accuracy**.

The end-point is determined by using an **indicator** where a **sudden** colour **change** is observed.

To attempt a virtual titration before your teacher shows you how to perform it in the lab, click here.

Before performing the titration your teacher will show you all of the apparatus involved in a titration and make a standard solution. Draw the apparatus, label it and describe what it is used for.

Reaction Title: ________________________________

Aim: ________________________________
____

Method:

Results:

Conclusion: ________________________________
____
____

Reaction Title: ______________________________

Aim: ______________________________

____

Method:

Results:

Conclusion: ______________________________

____

____

Reaction Title: ____

Aim: ____

____

Method:

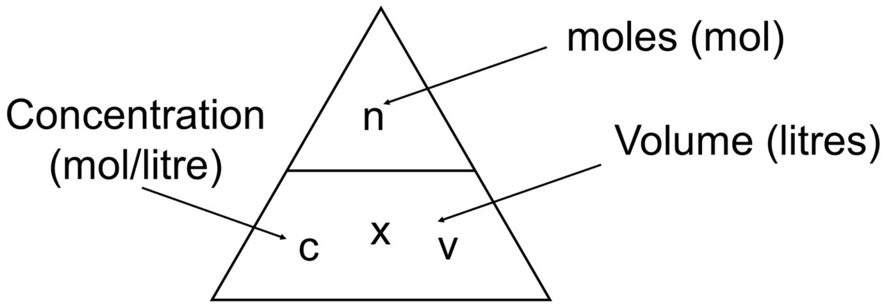
Results:

Conclusion: ____

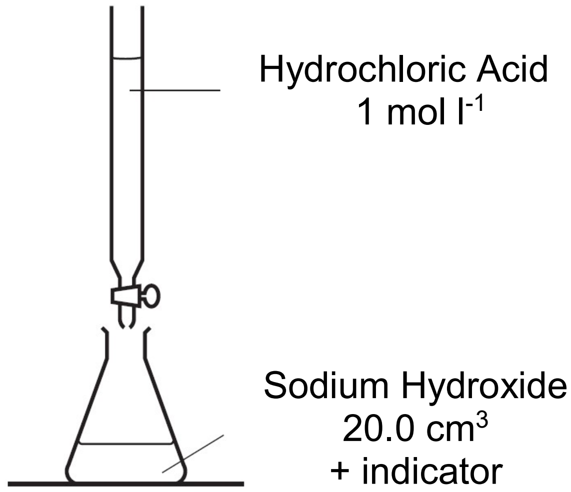
____

____

Titration calculations



Your teacher will demonstrate how to perform a titration calculation with the example below:



The average volume of 1 mol l^{-1} hydrochloric acid needed to neutralise 20.0 cm^3 sodium hydroxide (unknown concentration) solution was 18.0 cm^3. Calculate the concentration of the sodium hydroxide solution.

HCl + $NaOH$ → $NaCl$ + H_2O

Questions

1. The average volume of 0.5 mol l^{-1} sulfuric acid (H_2SO_4) required to neutralise 25.0 cm^3 of potassium hydroxide (KOH) solution was 30.0 cm^3. Calculate the concentration of the potassium hydroxide solution.

$$H_2SO_4 \quad + \quad 2KOH \quad \rightarrow \quad K_2SO_4 \quad + \quad 2H_2O$$

2. To neutralise 15.0 cm^3 of calcium hydroxide ($Ca(OH)_2$) solution, 20.0 cm^3 of 1.0 mol l^{-1} hydrochloric acid (HCl) was used. Find the concentration of the calcium hydroxide solution.

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

3. The neutralisation of 10.0 cm³ of sodium carbonate (Na_2CO_3) solution required 25.0 cm³ of 0.2 mol l⁻¹ nitric acid (HNO_3). Determine the concentration of the sodium carbonate solution.

$$2HNO_3 + Na_2CO_3 \rightarrow 2NaNO_3 + H_2O + CO_2$$

4. To completely neutralize 40.0 cm³ of ammonia (NH_3) solution, 35.0 cm³ of 0.1 mol l⁻¹ sulfuric acid (H_2SO_4) was used. Calculate the concentration of the ammonia solution.

$$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$$

Extension questions: Chemcord purple books (N5): page 59-61

Date: ________________

Acids and Bases – Summary

Use the space below to summarise key points before doing past paper questions and extension work.

Extension questions:

Chemcord purple books (N5): page 44-62

SCHOLAR

Topic	2015	2016	2017	2018	2019
Acids and Bases	MC – 10,11 S2 – 4b-c, 15	MC – 8 S2 – 3ci	MC – 5 S2 – 11a	MC – 8,9 S2 – 1a	MC – 11,12 S2 – 3b, 11b-d

MC = multiple choice section, S2 = section 2, the written section.