N5 Chemistry: Unit 3 – Chemistry in Society

Part B – Fertilisers, Nuclear and Chemical Analysis

Lesson 3 – Chemical Analysis Revision

Learning Outcomes

By the end of this lesson you should know:

1. How to summarise key concepts and techniques within the Chemical Analysis key area.

2. How to demonstrate your understanding by completing practice questions.

Success Criteria

You will have been successful in this lesson if you:

1. Watch the links provided

2. Complete revision questions provided

3. Complete and submit homework assigned (Homework 16 and 17)

There is also a further reading section to help you gain more depth of understanding for this section.

If you have any questions about the content of this lesson, you should ask your class teacher either through your class MS team or via email. MS Teams will be monitored throughout the week by a chemistry teacher. If you need help or clarification with either the task or the content of the lesson, just ask.

Links to Prior Knowledge

You may wish to revise the following to help you understand this lesson:

- N5 Unit 1: Acids and Bases – Titration

- N5 Unit 3: Metals

- N5 Unit 3: Chemical Analysis

Words written in italics do not need to be copied and are there to provide instruction.

Watch this video first:

https://youtu.be/VlS6cFtvTlY

(work continues on next page)

Timed Revision Starter

The table at the bottom of the page contains a number of questions from different parts of the N5 course. They are scored differently dependent on when your learned them – the boxes are colour coded to help you identify them.

You have **ten minutes** to answer as many questions from the table below correctly as you can. Answers can be found at the end of this document.

Be honest with yourself and good luck!

Last week 1 point	Before Christmas break 2 point	Before Summer break 3 points
Write the balanced chemical equation for the reaction between zinc and hydrochloric acid.	The half-life of an isotope is 2.5 minutes. Calculate the percentage left after 10 minutes.	Describe the concentration of H^+ and OH^- ions in an acidic solution.
Explain what is meant by the term 'concordant results' when carrying out a titration.	Calculate the number of moles in 32 g of sodium hydroxide (hint: you will need to find the chemical formula first).	A student stated that calcium phosphate was a good fertiliser. Explain why they were wrong.
Metals can be extracted from their ore where metal ions form metal atoms. State the name of this reaction.	What affect would increasing the temperature have on the half-life of an isotope?	State the seven diatomic elements

Nuclear Chemistry Revision Activities:

1. **Learning Outcomes and Question Booklet**
   Read through your N5 Unit 3 Chemical Analysis learning outcomes and answer the multiple-choice questions at the end of these. Remember to mark your answers!

2. **Scholar**
   Attempt **8.8 Chemical Analysis End of Topic Test**
   Teachers can check reports here so please complete this test as part of your work this week.

3. **Nuclear Chemistry Revision Mind-Map**
   Attempt this with no other learning materials around you. Complete as much as you can from memory – then use your notes to fill in the rest. This will help you to identify what you have learned and what you need to work on.

   This one covers the work we have covered in the past couple of lessons but remember that are a number of other outcomes covered in chemical analysis. You might want to create your own mind-map: leave blanks and attempt to fill them at a later date!

Chemistry Unit 3 Analysis

Qualitative Analysis

1. **Flame Testing** – detects _____ ions which produce different colours when placed in a flame. Details can be found in data booklet on page ___.

   Find the flame colour that would be observed if the following metals compounds were burned.

   Potassium chloride –

   Lithium chloride -

   Copper sulfate -

2. **Precipitation** – when substances in solution are mixed and an insoluble solid product (_____) is made.

   Information on the solubility of compounds can be found in data booklet on page ____.

3. **Gas Tests**

   A glowing splint is used to test for the presence of _____, it _____.

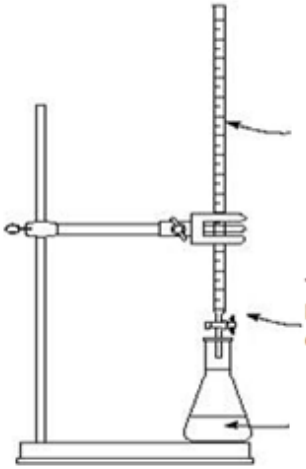
   A burning splint is used to test for the presence of _____, it _____ _____.

   Lime water is used to test for _____ _____ it changes from _____ to _____.

Quantitative Analysis - Titration

Titration analysis can be used to determine the concentration of acid or base used in a neutralisation reaction.

A _____ is used to put an accurate volume of the reactant (either acid or base) into the conical flask. Label the pieces of equipment below.

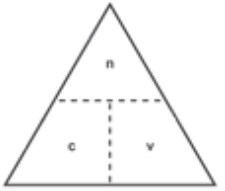


Why is an indicator added to the conical flask?

The first titration is carried out quickly to get a rough idea of the approximate volume. Why is this rough titre volume not used in calculations?

The _____ titre can be calculated using two **concordant values**. These are values that are within ____cm^3 of each other.

Titration Calculations



Volume must be converted from cm^3 to _____! To do this divide value by _____.

$10cm^3$ of $0.1mol\ l^{-1}$ HCl was required to neutralise $20cm^3$ of NaOH. Calculate the concentration of the alkali.

1. Balanced equation:
2. Calculate number of moles of reactant you have information about (Hint: for this question acid)
3. Using the mole ratio from the balanced equation and information from the question, find the unknown value.

More Examples:

1. What is the concentration of a NaOH solution if $20cm^3$ is neutralised by:

   a) $40cm^3$ of $2mol\ l^{-1}$ nitric acid?

   b) $40cm^3$ of $0.25mol\ l^{-1}$ sulfuric acid?

2. What volume of $0.1mol\ l^{-1}$ HCl is required to neutralise:

   a) $15cm^3$ of $0.02mol\ l^{-1}$ KOH

   b) $20cm^3$ of $0.05mol\ l^{-1}$ barium hydroxide solution?

Further Reading

To learn more about chemical analysis, try the following online resources:

BBC Bitesize: https://www.bbc.co.uk/bitesize/guides/zx6csrd/revision/1

Scholar: Log in through GLOW

National 5 Chemistry → Chemistry in Society → Chemical Analysis

Evans2 chem web: https://www.evans2chemweb.co.uk/

Username: snhs password: giffnock

Select any teacher → revision → National 5 → Unit 3: Chemistry in Society → Chemical Analysis

Extension Questions:

Yellow/Purple book Chemical Analysis Page 157

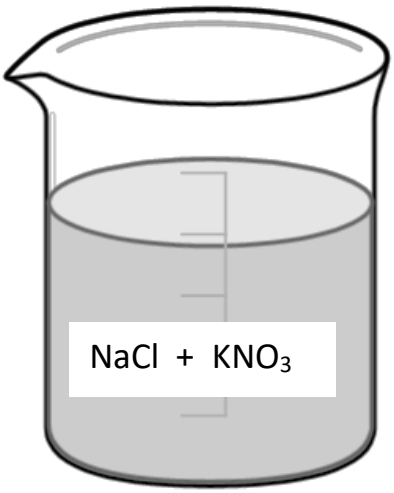
Complete self-check exercises in your class work jotter.

Self Check 12

1. (a) What is a precipitation reaction?

(b) Which reactions will produce a precipitate?
(You may wish to use the data booklet to help you.)

A



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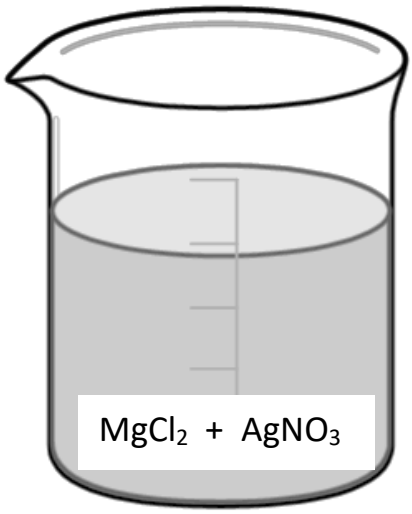

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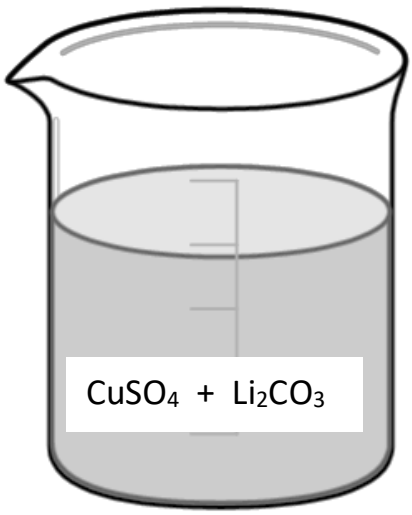

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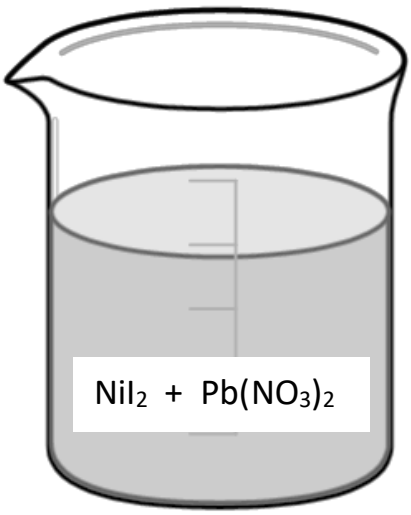

(C) For the above:

i. Name the precipitates formed.
ii. Write the formulae of the precipitates.
iii. Write the ionic formulae of the precipitates.

Self Check 12(continued)

2.

(a) Copy and complete the following balanced precipitation reactions:

(i) $AgNO_{3\,(aq)} + NaCl_{\,(aq)} \longrightarrow$

(ii) $BaCl_{2\,(aq)} + MgSO_{4\,(aq)} \longrightarrow$

(iii) $CaCl_{2\,(aq)} + Na_2CO_{3\,(aq)} \longrightarrow$

(iv) $CuSO_{4\,(aq)} + 2NaOH_{\,(aq)} \longrightarrow$

(v) $Fe(NO_3)_{3\,(aq)} + 3NaOH_{\,(aq)} \longrightarrow$

(b) What is a spectator ion?

(a) Name the spectator ions in each of the above reactions.

3. Rewrite the following precipitation reactions omitting the spectator ions:

(a) $Na^+Cl^-(aq) + Ag^+NO_3^-(aq) \rightarrow Na^+NO_3^-(aq) + Ag^+Cl^-(s)$

(b) $Zn^{2+}SO_4^{2-}(aq) + Ba^{2+}Cl_2^-(aq) \rightarrow Zn^{2+}Cl_2^-(aq) + Ba^{2+}SO_4^{2-}(s)$

(c) $(NH_4^+)_3PO_4^{3-}{}_{(aq)} + Al^{3+}(Br^-)_{3(aq)} \rightarrow Al^{3+}PO_4^{3-}{}_{(s)} + 3NH_4^+Br^-{}_{(aq)}$

(d) $(K^+)_2CO_3^{2-}{}_{(aq)} + Sn^{2+}SO_4^{2-}{}_{(aq)} \rightarrow Sn^{2+}CO_3^{2-}{}_{(s)} + (K^+)_2SO_4^{2-}{}_{(aq)}$

(e) $Pb(NO_3)_2(aq) + 2HCl(aq) \rightarrow PbCl_2(s) + 2HNO_3(aq)$

Time Revision Starter ANSWERS

Last week 1 point	Before Christmas break 2 point	Before Summer break 3 points
$Zn + 2HCl \rightarrow ZnCl_2 + H_2$	6.25 %	Acidic solutions have a higher concentration of H+ (aq) ions than OH^-(aq).
Results are within 0.2 cm^3 of each other.	0.8 moles	Calcium phosphate is insoluble.
Reduction (metal ions gain electrons to form metal atoms)	No effect – half-life is not affected by physical or chemical conditions.	Br_2, O_2, F_2, I_2, N_2, Cl_2, H_2