

PiXL Independence:

GCSE Chemistry – Student Booklet

KS4

Chemical analysis

Contents:

- I. Level 1- Multiple Choice Quiz – 20 credits
- II. Level 2 - 5 questions, 5 sentences, 5 words – 10 credits each
- III. Level 3 - Science in The News – 100 credits
- IV. Level 4 - Scientific Poster – 100 credits
- V. Level 5 - Video summaries – 50 credits each

PiXL Independence – Level 1
Multiple Choice Questions
GCSE Chemistry – Chemical analysis

INSTRUCTIONS

Score: /20

- Read the question carefully.
- Circle the correct letter.
- Answer all questions.

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1. The process of distillation involves:
 - a. Evaporation then freezing.
 - b. Evaporation then melting.
 - c. Evaporation then condensation.
 - d. Evaporation.

 2. To separate a solid from a solvent you use the process:
 - a. Distillation.
 - b. Filtration.
 - c. Crystallisation.
 - d. Fractional distillation.

 3. Chromatography included a:
 - a. Mobile and static phase.
 - b. Water phase and stationary phase.
 - c. Mobile and immobile phase.
 - d. Mobile and stationary phase.

 4. Impurities affect the boiling point by:
 - a. Making it higher.
 - b. Having no effect.
 - c. Making it lower.
 - d. Changing the structure.

 5. The conservation of mass principle is:
 - a. Gases escape because they are light.
 - b. The mass of the products can go down.
 - c. Atoms are lost as by-products.
 - d. Atoms are not created or destroyed, they are rearranged.

 6. The mass can change because:
 - a. Some of the reactants have not reacted.
 - b. A gas has been produced and escaped.
 - c. A gas has been produced and is lighter than a solid.
 - d. Some of the product sticks to the glassware.

7. One mole of water weighs:
- 18g.
 - 10g.
 - 8g.
 - 20g.
8. The relationship between mass, volume and concentration is:
- $C=M/V$.
 - $C=M \times V$.
 - $C=V/M$.
 - $C=M/2V$.
9. The relationship between two gases the volume and concentration is:
- $C_1V_1 = C_2/V_2$.
 - $C_1/V_1 = C_2/V_2$.
 - $C_1V_1 = C_2V_2$.
 - $C_1/V_1 = C_2V_2$.
10. Flame tests identify:
- Negative metal ions.
 - Negative metal atoms.
 - Positive metal ions.
 - Negative metal atoms.
11. The flame test colour for potassium is:
- Brick red.
 - Green.
 - Crimson.
 - Lilac.
12. The flame test colour for copper is:
- Brick red.
 - Green.
 - Crimson.
 - Lilac.
13. As well as flame test, which of the following can be used to identify cations:
- Combustion.
 - Oxidisation.
 - Precipitate.
 - Neutralisation.
14. Anions can be identified using:
- Dilute sulphuric acid and silver nitrate.
 - Dilute hydrochloric acid and silver nitrate.
 - Dilute nitric acid and silver nitrate.
 - Dilute citric acid and silver nitrate.

15. The anion Cl^- forms a:
- White precipitate
 - Cream precipitate.
 - Yellow precipitate.
 - Silver precipitate.
16. The advantages of using mass spectroscopy include:
- Speed, sensitivity and precision.
 - Speed, sensitivity and reproducibility.
 - Speed, sensitivity and accuracy.
 - Speed, sensitivity and repeatability.
17. Precipitate reactions for anions occur by adding a metal sulfate to:
- Sodium hydroxide.
 - Potassium hydroxide.
 - Hydrochloric acid.
 - Silver nitrate.
18. The colour of a copper precipitate is:
- Brick red.
 - Green.
 - Crimson.
 - Lilac.
19. The relative formula mass for calcium carbonate is:
- 10.
 - 50.
 - 40.
 - 100.
20. The balanced symbol equation for sodium hydroxide reacting hydrochloric acid is:
- $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$.
 - $2\text{NaOH} + \text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O}$.
 - $\text{NaOH} + \text{HCl}_2 \rightarrow \text{NaCl}_2 + \text{H}_2\text{O}$.
 - $\text{NaOH} + 2\text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$.

PiXL Independence – Level 2
5 questions, 5 sentences, 5 words
GCSE Chemistry – Chemical analysis

INSTRUCTIONS

- For each statement, use either the suggested website or your own text book to write a 5-point summary. In examinations, answers frequently require more than 1 key word for the mark, so aim to include a few key words.
- It is important to stick to 5 sentences. It is the process of selecting the most relevant information and summarizing it that will help you remember it.
- Write concisely and do not elaborate unnecessarily, it is harder to remember and revise facts from a big long paragraph.
- Finally, identify 5 key words that you may have difficulty remembering and include a brief definition. You might like to include a picture to help you remember it.

Example:

QUESTION:	Explain how chromatography occurs.			
Sources:	Website – http://www.explainthatstuff.com/chromatography.html https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/a/principles-of-chromatography			
<ol style="list-style-type: none"> 1. Chromatography is an analytical tool that separates dyes. 2. It involves a mobile phase, which moves. 3. It involves a stationary phase that does not move. 4. The solvent dissolves the sample and carries it up the paper; how attracted to the paper it is impacts on how far it travels. 5. The Rf value can be used to identify the component. 				
Rf	Stationary	mobile	attraction	dissolves

QUESTION 1:	Describe how flame tests are used to identify cations.			
Sources:	Website – 1. http://chemguide.co.uk/inorganic/group1/flametests.html 2. https://www.youtube.com/watch?v=1EXr_L7Ojgg			

QUESTION 2:	Explain the principles behind distillation.
Sources:	Website – 1. http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel_pre_2011/oneearth/fuelsrev1.shtml 2. https://www.thoughtco.com/what-is-distillation-601964

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QUESTION 3:

Explain the conservation of mass and how we use it.

Sources:

Website –

1. <https://www.thoughtco.com/definition-of-conservation-of-mass-law-604412>
2. http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/materials_from_earth/conservation_of_massrev1.shtml

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QUESTION 4:	How do we use Avogadro constant as scientists?
Sources:	Website – 1. http://www.bbc.co.uk/bitesize/higher/chemistry/calculations_1/mole/revision/1/ 2. https://www.bbc.co.uk/education/guides/zysk7ty/revision/2

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QUESTION 5:

Describe the tests for anions.

Sources:

Website –

1. <https://www.bbc.co.uk/education/guides/z27ycdm/revision>
2. <https://www.youtube.com/watch?v=3KdpmlaP4Xs>

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PiXL Independence – Level 3

Science in the News

GCSE Chemistry – Chemical analysis

INSTRUCTIONS

Fake news

Sensationalised news stories have been around for some time, but with the mass growth of social media, the problem seems to have grown in recent years. At the very least, the US Presidential election has certainly highlighted the impact that misleading information can have. www.tiny.cc/fakenews2

At home, the Brexit vote also suffered from the circulation of misleading news stories www.tiny.cc/fakenews3

Therefore, the ability to identify real information, track it back to the source article and make your own judgement is a very important skill. This activity will help you develop that skill.

How do forensic scientists use chromatography?

Discussion piece: http://www.bbc.co.uk/bang/handson/forensic_detective.shtml

News/Real article: <http://www.explainthatstuff.com/forensicscience.html>

Situation article: <http://www.propertiesofmatter.si.edu/fbiscience.html>

Task 1:

You need to produce a 1 page essay on how chromatography can be using in forensics.

Essay section	Activity
Introduction	State what paper is used for chromatography.
Describe	Describe how paper chromatography works.
Explore	Why do forensic scientists use it to solve crime?
Evaluate	Could a criminal be convicted on the evidence of chromatography alone? Discuss both the advantages and disadvantages and give an overall opinion.

Could flame test help identify the chemicals used in arson?

Discussion article: <http://thearsonproject.org/case-studies/>

Real piece:

http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel_pre_2011/patterns/forensicsciencerev2.shtml

Real piece: <https://www.thoughtco.com/perform-and-interpret-flame-tests-603740>

Task 2:

You need to produce a 1 page essay on the Flame tests and their possible uses.

Essay section	Activity
Introduction	What is a flame test?
Describe	Describe how a flame test is performed.
Explore	Compare the different colours and what they show.
Evaluate	Evaluate whether flame tests can ever be used to identify chemicals in a fire. Give both sides of the argument and then your overall opinion.

PiXL Independence – Level 4

Scientific Posters

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INSTRUCTIONS

Scientific Posters

Scientists communicate research findings in three main ways. Primarily, they write journal articles much like an experiment write up. These are very concise, appraise the current literature on the problem and present findings. Scientists then share findings at conferences through talks and scientific posters. During a science degree, you would practice all three of these skills.

Scientific posters are a fine balance between being graphically interesting and attracting attention and sharing just the right amount of text to convey a detailed scientific message. They are more detailed than a talk and less detailed than a paper.

Use this information to help structure your poster – www.tiny.cc/posterskills (that's Poster Skills not Posters Kill!) More detailed guidance is available at: www.tiny.cc/posterskills2

Creating your poster

It is easiest to create a poster in PowerPoint; however, you need to add custom text boxes rather than using the standard templates.



Posters need to be eye catching, but readable from a distance. If you use PowerPoint, start with a 4:3 slide (for easier printing, it can then be printed on A3) and use a 14-16 pt font. The first box could be larger to draw people in. You can use a background image, but pick a simple one that is of high quality. Select 'text box' fill and select 'change the transparency' to maintain the contrast and partially show the picture.

You can experiment with different layouts and you should include images. Avoid a chaotic layout, posters are read from top left column downwards.

Remember to include the authors and references.

Finally, look at the examples given on the University of Texas website which also offers an evaluation of each www.tinyurl.com/postereg

Chemical testing.

Background

All chemicals must be tested before they can be used by the public. They can also be tested to identify elements in compound. You are going to look into the various tests and how we use them to identify different elements.

Source articles

<https://www.thoughtco.com/perform-and-interpret-flame-tests-603740>

<http://chemguide.co.uk/organicprops/haloalkanes/agno3.html>

http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_21c/natural_environment/hydrosphererev4.shtml

<https://www.youtube.com/watch?v=RK1gdK7MHy0>

Use other sources as necessary.

Task:

Produce a scientific poster on the factors affecting the rate of reactions.

Recall	State the different tests for anions and cations.
Describe	Describe the methods for each test.
Compare	Compare the similarities and differences between the various tests.
Evaluate	Evaluate why one test may not be sufficient to identify the element, use magnesium as an example if you wish. Identify the advantages and disadvantages.

PiXL Independence – Level 5

Video summaries

GCSE Chemistry – Chemical analysis

Cornell Notes

At A level and University, you will make large amounts of notes, but those notes are only of use if you record them in a sensible way. One system for recording notes is known as the Cornell notes system. This method encourages you to select relevant information, rather than trying to write a transcript of everything said. More importantly, it forces you to spend a few minutes reviewing what you have written, which has been scientifically proven to aid learning and memory retention.

The ideal is to write everything on one page, but some students may prefer to type and others will to handwrite their notes. Whichever option you use, remember the aim is to summarise and condense the content with a focus on the objectives that you are trying to learn and understand.

There are three main sections to the Cornell notes

- 1 **Cue/ Objectives** – This can be done before or after the lecture. You may have been provided with the objectives or you may need to decide what they were or you may want to make the link to your learning if this is an additional task or lecture you are viewing, such as this video.
- 2 **Notes** – In this space you record concisely, simply the things you are LESS likely remember - **The NEW knowledge**.
- 3 **Summary** – The most important step that is carried out after the lecture or video. This helps to reinforce learning.

Background

The following short talks present two topics that link to your learning. The first looks at how we determine purity using the melting point. The second video discusses how natural products could reduce our demand for plastics.

Source article:

Video 1 – Melting point determination

Youtube clip: <https://www.youtube.com/watch?v=K5rliwSIhPO>

Video 2 – The hunt for the highest melting point

Youtube clip: https://www.ted.com/talks/eben_bayer_are_mushrooms_the_new_plastic

Task:

You need to produce a set of Cornell notes for the video given above.
Use the following objective to guide your note taking, this links to your learning.

- 1 Discuss how we determine purity using melting points.
- 2 Discuss why we hunt for the highest melting points and why it is relevant.

Objectives
What are the main learning outcomes that have been shared with you?
This will help guide you to taking the RIGHT notes during the video.

Title
Date

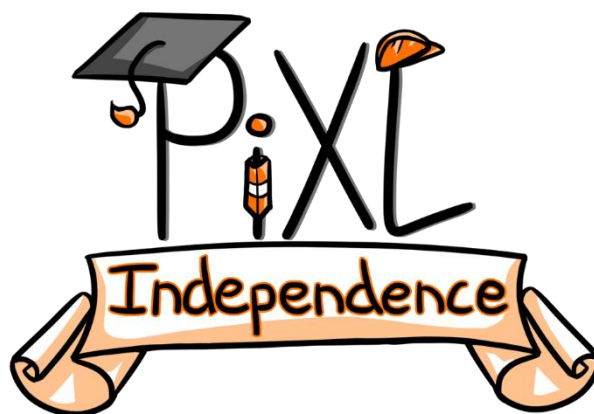
Sketch down note and key words
Do not write in full sentences whilst you listen, put quick sketches, single words, mind maps, short hand etc.
To help train you for university, try not to pause the video because you could not pause a live lecture (However, a lecture may give more natural pauses for you to catch up).

Summary (after the video)

What are your main points of learning from this video.
This is your chance to make sense of your notes.
Make clear connections to the things you need to know

Objectives:	Title:
	Date:
Summary:	

Objectives:	Title:
	Date:
Summary:	



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