PiXL Independence:

GCSE Chemistry – Student Booklet

KS4

Chemical changes

Contents:

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

INSTRUCTIONS **Score: /20**

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

1. The element lithium has the chemical symbol:
   a. L
   b. LI
   c. Li
   d. Lu

2. Methane has one carbon atom and four hydrogen atoms, so the chemical formula is:
   a. CH_4
   b. C_4H
   c. CH
   d. C_4H_4

3. The balanced symbol equation for sodium reacting with chlorine is:
   a. $2Na + Cl_2 \rightarrow 2NaCl_2$
   b. $Na + Cl_2 \rightarrow NaCl_2$
   c. $2Na + Cl_2 \rightarrow NaCl_2$
   d. $2Na + Cl_2 \rightarrow 2NaCl$

4. When oxygen reacts the half equation is:
   a. $O_2 \rightarrow 2O^{2-} + 2e^-$
   b. $O_2 \rightarrow 2O^{2-} + 4e^-$
   c. $O_2 \rightarrow O^{2-} + 4e^-$
   d. $O_2 \rightarrow O^{2-} + 2e^-$

5. The chemical formula for magnesium chloride is, as the ions are Mg^{2+} and Cl^-:
   a. $MgCl_2$
   b. Mg_2Cl
   c. MgCl
   d. Mg_2Cl_2

6. The test for hydrogen gas is:
   a. Limewater goes cloudy.
   b. Relights a glowing splint.
   c. Bleaches litmus paper.
   d. Squeaky pop test.

7. The test for carbon dioxide is:
    a. Limewater goes cloudy.
    b. Relights a glowing splint.
    c. Bleaches litmus paper.
    d. Squeaky pop test.

8. Copper carbonate reacts with hydrochloric acid to produce:
    a. Copper chloride and carbon dioxide.
    b. Copper carbonate and carbon dioxide.
    c. Copper chloride and hydrogen.
    d. Copper carbonate and hydrogen.

9. Acids dissolve in water to produce:
    a. OH^-
    b. H^+
    c. H^-
    d. OH^+

10. Alkalis dissolve in water to produce:
    a. OH^-
    b. H^+
    c. H^-
    d. OH^+

11. The general neutralisation equation is:
    a. Acid + Alkali → Salt + Hydrogen
    b. Acid + Alkali → Salt + Water
    c. Acid + Alkali → Hydroxide + Water
    d. Acid + Alkali → Hydroxide + Hydrogen

12. The general ionic equation for neutralisation is:
    a. $H + OH \rightarrow H_2O$
    b. $H^- + OH^- \rightarrow H_2O$
    c. $H^+ + OH^- \rightarrow H_2O$
    d. $H^+ + OH^- \rightarrow 2H_2O$

13. When a metal reacts it forms:
    a. A positive ion.
    b. An atom.
    c. A negative ion.
    d. A covalent bond.

14. A concentrated solution of acid contains:
    a. Fully ionised hydrogen ions.
    b. Partially ionised ions.
    c. Fully ionised hydroxide ions.
    d. Partially ionised hydroxide ions.

15. When molten lead bromide undergoes electrolysis the products are:
    a. Lead and bromide.
    b. Lead and oxygen.
    c. Lead and bromine.
    d. Lead and water.

16. Reduction reactions are:
    a. The losing of electrons.
    b. The gaining of oxygen.
    c. The gaining of electrons.
    d. The losing of ions.

17. The opposite reaction of reduction is:
    a. Oxidation.
    b. Oxygenation.
    c. Gaining.
    d. neutralisation.

18. In Fe_2O_3 the iron is:
    a. Oxidised.
    b. Reduced.
    c. Neutralised.
    d. Combusted.

19. During electrolysis, non-metals go to the:
    a. Cathode.
    b. Electrolyte.
    c. Solution.
    d. Anode.

20. Non-metals go to this electrode as they are:
    a. Positively charged.
    b. Neutral.
    c. Negatively charged.
    d. Larger.

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

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 clip art style picture to help you remember it.**

Example:

QUESTION:	**Explain conservation of mass, including a balanced symbol equation.**
Sources:	**Website –** **1.** https://www.youtube.com/watch?v=0IIJ4IglmK8 **2.** http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/materials_from_earth/conservation_of_massrev1.shtmlistryrev1.shtml

1. **The elements reacting need to be represented in the products.**
2. **The mass of the reactants equals the mass of the products.**
3. **$2Zn + 2HCl \rightarrow ZnCl_2 + H_2$.**
4. **During a reaction no elements are created or destroyed.**
5. **The products have different properties to the reactants.**

mass	**equal**	**created**	**destroyed**	**atoms**

QUESTION 1:	**Explain the electrolysis of lead bromide.**
Sources:	**Website –** 1. http://www.gcsescience.com/ex5.htm 2. https://www.youtube.com/watch?v=4x2ZCSr23Z8

QUESTION 2:	**Identify the common tests for chlorine, oxygen, carbon dioxide and hydrogen.**
Sources:	**Website –** 1. http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel_pre_2011/chemicalreactions/preparinggasesrev4.shtml 2. https://www.youtube.com/watch?v=LiAvDpl5aJA

QUESTION 3:	**Describe the neutralization of sodium hydroxide and hydrochloric acid, include a balanced symbol equation.**
Sources:	**Website –** 1. http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_21c/chemical_synthesis/whychemicalsrev10.shtml 2. http://www.gcsescience.com/aa27.htm

QUESTION 4:	**Explain redox reactions.**
Sources:	**Website –** 1. Redox reactions - Oxidising and reducing agents - Higher Chemistry Revision - BBC Bitesize 2. http://www.s-cool.co.uk/a-level/chemistry/electrochemistry/revise-it/redox-reactions

QUESTION 5:	**Describe how the pH is used to measure the acidity of substances and what makes them acidic.**
Sources:	**Website –** 1. The pH scale - pH scale and indicators - GCSE Chemistry (Single Science) Revision - Other - BBC Bitesize 2. https://www.sciencebuddies.org/science-fair-projects/references/acids-bases-the-ph-scale

PiXL Independence – Level 3
Science in the News
GCSE Chemistry – Chemical changes

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.

At home, the Brexit vote also suffered from the circulation of misleading news stories 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.

Are hydrogen cars the answer to the car polluting problem?

News article: Energy use for hydrogen fuel-cell vehicles: higher than electrics, even hybrids (analysis) (greencarreports.com)

Discussion article: http://www.autoexpress.co.uk/car-news/93180/hydrogen-cars-new-government-funding-for-fuel-cell-vehicles

Real article: http://auto.howstuffworks.com/fuel-efficiency/hybrid-technology/hydrogen-cars.htm

Task 1:

You need to produce a 1 page essay on hydrogen cars and their levels of pollution.

Essay section	Activity
Introduction	Write about the issues with normal cars polluting the environment and the race to find a solution.
Describe	Describe the hydrogen car and how the fuel is produced.
Explore	Why do people choose to have hydrogen cars? Include reasons such as cost and prestige.
Evaluate	Is hydrogen the answer or is another car a better option? Give both side of the argument and then your opinion.

What is the science behind plasma?

Discussion/News article: Haunting space image shows million mile long jet of plasma shooting from the Sun | The Sun

Real piece: Pluto Wags its Tail | NASA

Real article: Plasma: The Fourth State of Matter (futurism.com)

Task 2:

You need to produce a 1 page essay on the science behind plasma.

Essay section	Activity
Introduction	What are the three states of matter and how does the fourth state compare?
Describe	Describe the fourth state of matter, linking in its properties.
Explore	Explore the uses of plasma and its role in the universe.
Evaluate	Evaluate whether plasma is the universe's missing matter.

PiXL Independence – Level 4
Scientific Posters
GCSE Chemistry – Chemical changes

INSTRUCTIONS

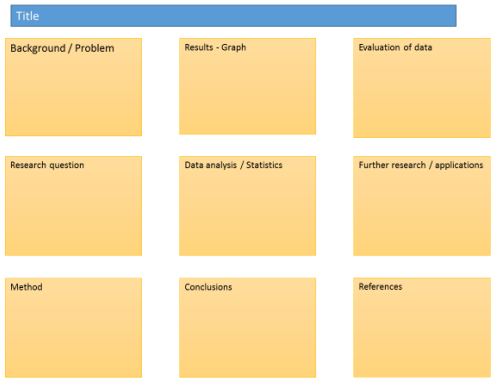
Scientific Posters

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 – https://www.wikihow.com/Make-a-Scientific-Poster
More detailed guidance is available at: https://guides.nyu.edu/posters

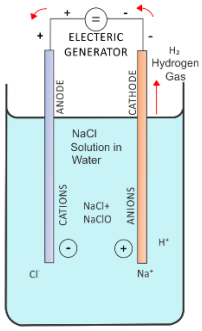
Creating your poster

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 https://ugs.utexas.edu/our/poster/samples

Electrolysis



Background

Electrolysis affects our everyday life and is very important to us. We need to understand the process of electrolysis why it is important in the advancement of technologies.

Source articles

http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/electrolysis/
https://www.britannica.com/science/electrolysis
https://getrevising.co.uk/revision-cards/aqa_gcse_chemistry_c25_salts_and_electrolysis

Use other sources as necessary.

Task:

Produce a scientific poster on how electrolysis occurs and the products from both molten and aqueous solutions.

Recall	Write the definition of electrolysis.
Describe	Describe the process of electrolysis.
Compare	Compare molten solutions with aqueous solutions, including products.
Evaluate	Can covalent molecules ever be broken down by electrolysis, include reasons for your answer.

PiXL Independence – Level 5
Video summaries
GCSE Chemistry – Chemical changes

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 TED talks present two topics that link to your learning. The first is a look at dark matter and what it is. The second video discusses what makes up our universe and looks at our understanding of particles.

Source article:

Video 1 – Shedding the light on dark matter
Ted talks clip: https://www.ted.com/talks/patricia_burchat_leads_a_search_for_dark_energy

Video 2 – Why our universe exists on a knife edge
Ted talks clip:
https://www.ted.com/talks/gian_giudice_why_our_universe_might_exist_on_a_knife_edge

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 what matter is.
2 Discuss what matter and how it reacts.

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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