

# **PiXL Independence:**

## **GCSE Chemistry – Student Booklet**

### **KS4**

#### **Organic chemistry**

#### **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 – Organic Chemistry**

**INSTRUCTIONS**

Score: /20

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

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1. The functional group for a carboxylic acid is:
    - a. C=C
    - b. -COOH
    - c. -OH
    - d. -C-C-
  
  2. All alkenes contain:
    - a. C=C
    - b. -COOH
    - c. -OH
    - d. -C-C-
  
  3. The formula for ethanol is:
    - a. C<sub>2</sub>H<sub>6</sub>
    - b. C<sub>2</sub>H<sub>4</sub>
    - c. C<sub>2</sub>H<sub>3</sub>OOH
    - d. C<sub>2</sub>H<sub>5</sub>OH
  
  4. When ethane burns during complete combustion, the products formed are:
    - a. CO<sub>2</sub> + H<sub>2</sub>O
    - b. CO + H<sub>2</sub>O
    - c. CO<sub>2</sub> + CO
    - d. CO<sub>2</sub> + H<sub>2</sub>
  
  5. A monomer must contain:
    - a. A C=C double bond.
    - b. A C-C double bond.
    - c. A C-C- single bond.
    - d. Carbon and hydrogen.
  
  6. Addition polymerisation includes:
    - a. Adding monomers together by breaking the double bond.
    - b. Adding polymers together by breaking the double bond.
    - c. Adding many molecules together to form a long chain.
    - d. Adding molecules together to form different plastics.

7. The formula for ethanoic acid is:
  - a.  $\text{HCOOH}$
  - b.  $\text{CH}_3\text{COOH}$
  - c.  $\text{CH}_3\text{CH}_2\text{COOH}$
  - d.  $\text{CH}_3\text{OOH}$
  
8. The formula for methane is:
  - a.  $\text{CH}$
  - b.  $\text{CH}_3\text{OH}$
  - c.  $\text{C}_2\text{H}_6$
  - d.  $\text{CH}_4$
  
9. Poly(ethene) is produced from the monomer:
  - a. Propene.
  - b. Ethane
  - c. Butene
  - d. Ethene
  
10. DNA is a type of:
  - a. Monomer.
  - b. Alcohol.
  - c. Polymer.
  - d. Alkane.
  
11. The four monomer that produce DNA are known as:
  - a. Nucleotides.
  - b. Prototides.
  - c. Genes.
  - d. ATBG.
  
12. Functional groups on molecules:
  - a. Identify the homologous series.
  - b. Identify the heterologous series.
  - c. Identify the alcohol.
  - d. Identify the monomer.
  
13. Ethanoic acid is made by:
  - a. Reduction of ethane.
  - b. Oxidisation of ethene.
  - c. Reduction of ethanol.
  - d. Oxidisation of ethanol.
  
14. Condensation polymerisation includes the functional groups:
  - a. Diol and di-double bond.
  - b. Diol and diacid.
  - c. Diol, diacid and di-carbon bond.
  - d. Diacid and di-double bond.

15. Condensation polymerisation often produces:
- Water.
  - Hydrogen.
  - Alcohol.
  - Oxygen.
16. The functional group for an alkane is:
- COOH
  - C=C
  - C-C
  - OH
17. The formula for butane is:
- $C_3H_6OH$
  - $C_4H_{10}$
  - $C_4H_9OH$
  - $C_3H_6$
18. DNA is made from:
- Protein.
  - Fatty acids.
  - Amino acids.
  - Water.
19. The functional group of an alcohol is:
- OH
  - C=C
  - C-C
  - COOH
20. The only molecule below that is not an alcohol is:
- $C_2H_5OH$
  - $CH_3OH$
  - $CH_4$
  - $C_3H_7OH$

**PiXL Independence – Level 2**  
**5 questions, 5 sentences, 5 words**  
**GCSE Chemistry – Organic chemistry**

**INSTRUCTIONS**

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- 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:**

<b>QUESTION:</b>	Explain how addition polymerisation occurs.			
<b>Sources:</b>	Website – <a href="http://www.chemguide.co.uk/organicprops/alkenes/polymerisation.html">http://www.chemguide.co.uk/organicprops/alkenes/polymerisation.html</a> <a href="http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway_pre_2011/carbon_chem/5_making_polymers3.shtml">http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway_pre_2011/carbon_chem/5_making_polymers3.shtml</a>			
<ol style="list-style-type: none"><li>1. Many monomers containing C=C double bonds.</li><li>2. The monomer is unsaturated because of the double bond.</li><li>3. One of the doubles breaks and they join up end to end.</li><li>4. A long chain polymer is produced which is saturated.</li><li>5. The polymer repeating unit looks the same as the monomer with the exception of the double bond.</li></ol>				
monomer	polymer	Saturated	Unsaturated	Repeating unit

**QUESTION 1:** Explain how condensation polymerization occurs.

**Sources:**

**Website –**

1. [http://www.bbc.co.uk/bitesize/intermediate2/chemistry/carbon\\_compounds/plastics\\_synthetic\\_fibres/revision/5/](http://www.bbc.co.uk/bitesize/intermediate2/chemistry/carbon_compounds/plastics_synthetic_fibres/revision/5/)
2. <http://www.s-cool.co.uk/a-level/chemistry/aromatic-and-plastics/revise-it/polymerisation>

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<b>QUESTION 2:</b>	<b>Name and draw the structural formula for the first four members of the homologous series alcohols. Then predict the fifth structural formula.</b>			
<b>Sources:</b>	<b>Website –</b> 1. <a href="http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/alcohols_carboxylic_acids_esters/alcohols/revision/1/rev4.shtml">http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/alcohols_carboxylic_acids_esters/alcohols/revision/1/rev4.shtml</a> 2. <a href="http://www.docbrown.info/page06/FunctionalGroups.htm">http://www.docbrown.info/page06/FunctionalGroups.htm</a>			

**QUESTION 3:** Explain how an alcohol can be made into an ester.

**Sources:**

**Website –**

1. <http://chemguide.co.uk/organicprops/alcohols/oxidation.html>
2. [http://www.bbc.co.uk/bitesize/higher/chemistry/carbon/reaction\\_carbon/revision/2/](http://www.bbc.co.uk/bitesize/higher/chemistry/carbon/reaction_carbon/revision/2/)

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**QUESTION 4:** Describe DNA as a polymer.

**Sources:**

**Website –**

1. [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_ocr\\_gateway/living\\_growing/moleculesrev3.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_gateway/living_growing/moleculesrev3.shtml)
2. <http://www.chem.wisc.edu/deptfiles/genchem/netorial/modules/biomolecules/modules/dna1/dna13.htm>

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**QUESTION 5:** Describe how alkanes undergo combustion and predict the products formed.

**Sources:**

**Website –**

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

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**PiXL Independence – Level 3**  
**Science in the News**  
**GCSE Chemistry – Organic chemistry**

**INSTRUCTIONS**

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**Fake news**

Sensationalized 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](http://www.tiny.cc/fakenews2)

At home, the Brexit vote also suffered from the circulation of misleading news stories [www.tiny.cc/fakenews3](http://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 can we take natural substances and make everyday items?**

News article: <http://www.mirror.co.uk/news/world-news/japan-rocked-62-magnitude-earthquake-11300042>

News article: <https://bcachemistry.wordpress.com/tag/perfume/>

Real article:

[http://www.bbc.co.uk/schools/gcsebitesize/science/ocr\\_gateway/carbon\\_chemistry/smellsrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/carbon_chemistry/smellsrev1.shtml)

**Task 1:**

You need to produce a 1 page essay on how esters can be used as perfumes.

<b>Essay section</b>	<b>Activity</b>
<b>Introduction</b>	Describe what an ester is.
<b>Describe</b>	Describe how esters can be manufactured from alcohol.
<b>Explore</b>	How and why did we start to use esters as perfumes?
<b>Evaluate</b>	Can all esters be made into perfumes and are they safe? Discuss both the advantages and disadvantages and give an overall opinion.

### Is a polymer always a plastic?

Discussion article: <https://science.howstuffworks.com/plastic2.htm>

Discussion piece: <https://www.nobelprize.org/educational/chemistry/plastics/readmore.html>

Real piece: <https://www.thoughtco.com/monomers-and-polymers-intro-608928>

### Task 2:

You need to produce a 1 page essay polymers and their uses.

<b>Essay section</b>	<b>Activity</b>
<b>Introduction</b>	What are polymers?
<b>Describe</b>	Describe how polymers are formed.
<b>Explore</b>	Compare the differences between the two types of polymerisation.
<b>Evaluate</b>	Evaluate whether all polymers are plastics. Give both sides of the argument and then your overall opinion.

# PiXL Independence – Level 4

## Scientific Posters

### GCSE Chemistry – Organic chemistry

#### INSTRUCTIONS

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##### 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](http://www.tiny.cc/posterskills) (that's Poster Skills not Posters Kill!) More detailed guidance is available at: [www.tiny.cc/posterskills2](http://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/postereq](http://www.tinyurl.com/postereq)

## Polymers and plastics.

### Background

All plastics are polymers but not all polymers are plastics. We only need to look at nature to see the differences. How can society use this to help modern life?

### Source articles

<https://science.howstuffworks.com/plastic2.htm>

<http://www.biology.arizona.edu/biochemistry/activities/DNA/10t.html>

<https://www.thoughtco.com/monomers-and-polymers-intro-608928>

<https://www.youtube.com/watch?v=UwRVj9rz2QQ>

Use other sources as necessary.

### Task:

Produce a scientific poster on polymers.

<b>Recall</b>	State the reasons DNA is a polymer.
<b>Describe</b>	Describe the processes of polymerisation.
<b>Compare</b>	Compare the similarities and differences between plastic polymers and DNA.
<b>Evaluate</b>	Explain how other synthetic polymers have been made and evaluate their processes. The advantages and disadvantages.

# PiXL Independence – Level 5

## Video summaries

### GCSE Chemistry – Organic chemistry

#### 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 can use biology to produce new technologies. The second video discusses how natural products could remove our need for plastics.

#### Source article:

#### Video 1 – Design at the intersection of technology and biology

##### Ted talks clip:

[https://www.ted.com/talks/neri\\_oxman\\_design\\_at\\_the\\_intersection\\_of\\_technology\\_and\\_biology](https://www.ted.com/talks/neri_oxman_design_at_the_intersection_of_technology_and_biology)

#### Video 2 – Are mushrooms the new plastics?

Ted talks clip: [https://www.ted.com/talks/eben\\_bayer\\_are\\_mushrooms\\_the\\_new\\_plastic](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 nature can be used to help develop modern technologies.
- 2 Discuss how nature can be used to help sustain our world by replacing crude oil products.

**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

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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).

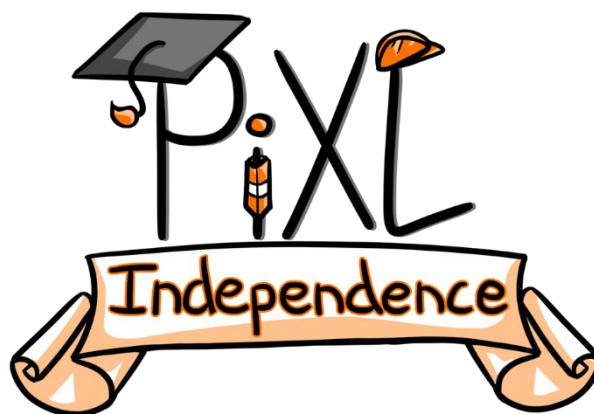
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**Summary (after the video)**  
What are your main points of learning from this video.  
This is your chance to make sense of your notes.  
Make clear connections to the things you need to know



<b>Objectives:</b>	<b>Title:</b>
	<b>Date:</b>
<b>Summary:</b>	

<b>Objectives:</b>	<b>Title:</b>
	<b>Date:</b>
<b>Summary:</b>	



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