

**Task 6: Organic Chemistry Topic Test**

**Question/Answer Booklet**

**CHEMISTRY UNIT 1**

Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher’s Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# TIME ALLOWED FOR THIS PAPER

Reading time before commencing work: 5 minutes

Working time for the paper: 45 minutes

# MATERIALS REQUIRED/RECOMMENDED FOR THIS PAPER

**To be provided by the supervisor:**

This Question/Answer Booklet

Multiple-choice Zipgrade Answer Sheet

Chemistry Data Book

**To be provided by the candidate:**

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, eraser, correction tape/fluid, ruler, highlighters

Special items: up to three non-programmable calculators approved for use in the WACE examinations

# IMPORTANT NOTE TO CANDIDATES

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further

**Part 1: Multiple Choice [25 marks]**

1. Which of the following show the general formula for alkanes?
2. CnHn
3. CnH2n
4. CnH2n+2
5. CnHn+2
6. The term ‘saturated’ when referring to hydrocarbons means the compound:
7. Undergoes an addition reaction with water.
8. Is only made up of carbon and hydrogen atoms.
9. Only contains carbon-carbon single bonds.
10. Contains multiple bonds between carbon atoms.
11. The reactions between chlorine and methane in ultra violet light is an example of
12. an elimination reaction
13. a substitution reaction
14. an addition reaction
15. a condensation reaction
16. Circle the most correct: C6H12 is the chemical formula of
17. A haloalkane
18. A benzene
19. An alkane
20. An alkene
21. An addition reaction between an unknown and but-2-ene yields 2-iodobutane as a product. The unknown must be:
22. Iodine
23. Hydroiodic acid
24. Hydrogen gas
25. Water
26. Which organic compound has a different molecular formula to the others?
27. 3-ethylpent-1-ene.
28. 4,4-dimethylhex-2-ene.
29. 3-ethyl-2-methylpent-2-ene.
30. 3-ethylhex-3-ene.
31. In the substitution reaction between ethane and bromine in UV light, the products are 1-bromoethane and:
32. Hydrobromic acid
33. Hydrogen gas
34. 2-bromoethane
35. There is no second product
36. Which of the following compounds cannot exist?
37. C2H3
38. C2H4
39. C3H8
40. C4H10
41. Which of the following molecules has the highest carbon to hydrogen ratio?
42. Hexane
43. Hexene
44. Cyclohexane
45. Benzene

**Questions 10, 11 and 12 refer to the four organic compounds in the table below, shown as condensed formulas.**

|  |  |
| --- | --- |
| **A**  (CH3)3CCH2CH2CH3 | **B**  CH3CH(CH3)CHCHCH3 |
| **C**  CH3CH2CH(C2H5)CH(CH3)CH3 | **D**  CH3(CH2)5CH3 |

1. Which compound is unsaturated?
2. A
3. B
4. C
5. D
6. Which compound has the IUPAC name 2,2-dimethylpentane?
7. A
8. B
9. C
10. D
11. The full structural formula of which compound is shown below?



1. A
2. B
3. C
4. D
5. Which of the following compounds is a hydrocarbon?

I C6H12O6 (glucose) II C6H6 (benzene)

III C5H12 (pentane) IV CH3Cl (chloromethane)

1. I, II and III only
2. III Only
3. II and III only
4. They are all hydrocarbons
5. Which one of the following is **not** a reason for carbon to be able to form large numbers of compounds?
6. The ability of carbon atoms to form four covalent bonds.
7. The ability of carbon atoms to bond to each other in covalent network structures.
8. The ability of carbon atoms to form single, double, and triple covalent bonds.
9. The ability of carbon atoms to bond with each other to form long stable chains.
10. A sample of hex-2-ene was placed in a beaker containing excess water, as well as several millilitres of concentrated sulfuric acid. The reaction mixture was stirred and left until any reaction had stopped.

Which of the following substances would **not** be found in the beaker at the completion of the reaction?

1. CH3CHCHCH2CH2CH3
2. H2O
3. H2SO4
4. CH3CHOHCH2CH2CH2CH3

**Part B: Short Answer (18 marks)**

**Question 1 (7 marks)**

A student was practising the naming and drawing of various organic compounds.

(a) Complete the table below by drawing structural formulas of the organic substances indicated. Structures should include all bonds. (4 marks)

|  |  |
| --- | --- |
| (i) 1,2-difluoropropene | (ii) 2,3-diethylbutane |
| (iii) 2-bromo-2,3-dimethylpentane | (iv) trichloroethene |

One of the substances in part (a) has been incorrectly named, i.e. the name has not been stated according to IUPAC rules.

(b) Which name is incorrect? Explain why the name is incorrect and give the appropriate IUPAC name for the substance. (3 marks)

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**Question 2 (6 marks)**

Consider the organic compounds (A to C) shown in the table below.

(a) Complete the table below by writing the IUPAC name of each compound. (3 marks)

|  |  |  |
| --- | --- | --- |
|  | Structure | IUPAC Name |
| **A** |  |  |
| **B** |  |  |
| **C** |  |  |

(b) Write a chemical equation for the catalysed reaction that occurs between benzene and aqueous chlorine. (3 marks)

|  |
| --- |
|  |

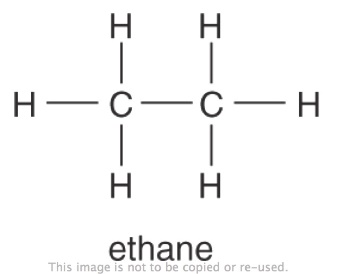
**Question 3 (5 marks)**

Both ethane and ethene can react with aqueous bromine, however the products for both of these reactions are different.

(a) Complete the following reactions so that the products (including any unwanted by-products) are shown. (3 marks)

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Description automatically generated



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(b) By using a different reagent in the reaction with ethene, a product can be made that is identical to the product obtained from reacting bromine with ethane. Which reagent is this, and how does it cause an identical product to form? (2 marks)

**Part C: Extended Response (12 marks)**

A chemistry student had two unlabelled beakers, each containing a different colourless liquid. One contained hexane, CH3CH2CH2CH2CH2CH3(l), and the other hex-1-ene, CH2CHCH2CH2CH2CH3(l).

The student added a few drops of liquid bromine, Br2(l), to each beaker in order to distinguish the liquids.

1. Why is it important that the liquid bromine be limiting (i.e. only a few drops are added) for this distinguishing test to be effective? (2 marks)

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Whilst no immediate or visible reaction was observed to occur with the hexane, in the presence of an appropriate catalyst, a slow reaction has the potential to take place.

2. Write a balanced equation for this reaction, including phase symbols, and name the type of reaction that is occurring. (4 marks)

|  |
| --- |
| Equation:  Type of reaction: |

The equation for the reaction with liquid hex-1-ene is shown below.

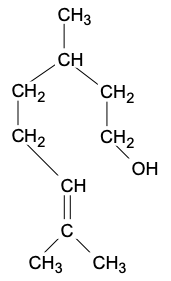


If hex-3-ene had been used in place of hex-1-ene in the reaction above;

3. Draw and name the product of the reaction. (2 marks)

|  |  |
| --- | --- |
| Structural diagram: | IUPAC name: |

The organic substance ‘citronellol’ is found in citronella and essential oils isolated from lemongrass. It is used in soaps, candles, incense, cosmetics and insect repellents. A molecule of citronellol is shown below.



A pure sample of liquid citronellol was mixed with a few drops of iodine water, I2(aq).

4. Write a balanced equation for the reaction that would take place, list any observations you would expect to see, and name the type of reaction occurring. (4 marks)

|  |
| --- |
| Equation:  Observation:  Type of reaction: |