11.2 Alkanes

Set A Foundations

Name	Time 1 hour	Total 31 marks	Score ____ / 31

A Data Booklet may be used.

A From the lesson

13 MARKS

1 Name $CH_3CH(CH_3)CH(CH_3)CH_3$.

.....

[1]

/1

Source: Learners' Alley, Alkanes slides

2 COMMON 10 cm^3 of a gaseous hydrocarbon needs exactly 50 cm^3 of O_2 for complete combustion and gives 30 cm^3 of CO_2. Find its formula.

[3]

/3

Source: Learners' Alley, Alkanes slides

3 COMMON Find the statistical ratios of

(a) 1-chloropropane : 2-chloropropane from propane

[1]

(b) the two monochloro products of 2-methylpropane

[1]

/2

Source: Learners' Alley, Alkanes slides

4 COMMON Why does pentane boil higher than 2,2-dimethylpropane?

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..... **[2]**

/2

Source: Learners' Alley, Alkanes slides

5 Write the two propagation steps for $CH_4 + Br_2$.

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..... **[2]**

/2

Source: Learners' Alley, Alkanes slides

6 What conditions favour monosubstitution?

..... **[1]**

/1

Source: Learners' Alley, Alkanes slides

7 Why are alkanes insoluble in water?

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..... **[2]**

/2

Source: Learners' Alley, Alkanes slides

B Practice

18 MARKS

8 COMMON Excess pentane was reacted with bromine in the presence of UV light. Assuming that only mono-bromination takes place and the reaction occurs at the same rate at all carbon atoms, what is the ratio of the products formed?

	1-bromopentane	2-bromopentane	3-bromopentane
A	1	3	2
B	3	1	2
C	1	2	3
D	3	2	1

Answer ☐ **[1]**

/1

Source: VJC 2012 Prelim P1 Q18, via EJC Alkanes Topical Revision, Q4

9 COMMON Alkanes differ in their boiling points. Four alkanes are given below.

1 C_4H_{10}
2 $CH_3(CH_2)_3CH_3$
3 $CH_3C(CH_3)_2CH_3$
4 $CH_3CH_2CH(CH_3)_2$

Which of the following shows the correct sequence of the boiling points of the four alkanes given?

A 1 < 2 < 3 < 4 **B** 1 < 3 < 4 < 2 **C** 2 < 3 < 4 < 1 **D** 2 < 4 < 3 < 1

Answer [1]

/1

Source: CJC 2013 Prelim P1 Q15, via EJC Alkanes Topical Revision, Q5

10 Name the following compounds.

(a) $CH_3C(CH_3)_2CH_2CH_3$

.....[1]

(b) $CH_3CH(C_2H_5)CH(CH_3)CH_3$

.....[1]

/2

Source: RJC H2 Chemistry Tutorial 11 (Alkanes), Q1(a) and (b)

11 COMMON Arrange the following hydrocarbons in order of increasing boiling point, giving your reasons: (a) 2-methylhexane, (b) heptane, (c) 3,3-dimethylpentane, (d) hexane, (e) 2-methylpentane.

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.....[4]

/4

Source: RJC H2 Chemistry Tutorial 11 (Alkanes), Q2

12 30 cm^3 of an alkane is completely burnt in 340 cm^3 (excess) of oxygen and the volume of residual gases is measured at room temperature and pressure. These are then shaken with aqueous sodium hydroxide solution. Once again, the volume of gas is measured. The volume of residual gas before shaking with NaOH is 250 cm^3 and after shaking with NaOH is 100 cm^3. Calculate the relative molecular mass, M_r, of the alkane. Draw and name all the possible isomers of the alkane.

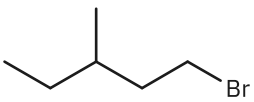
[3]

/3

Source: RJC H2 Chemistry Tutorial 11 (Alkanes), Q4

13 CHALLENGE Bromination of 3-methylpentane produces a mixture of four different monobromoalkanes.

One of them is compound X.



compound X

(a) Name and describe the mechanism of the reaction between 3-methylpentane and bromine to form compound X. You may use the formulae R–CH_3 and R–CH_2Br to represent the structures of 3-methylpentane and compound X respectively.

[3]

(b) Use your mechanism from (a) to suggest why the bromination can be carried out with yellow light (which has lower energy) but chlorination requires blue or ultraviolet light (which has higher energy).

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..... **[1]**

(c) Draw the structures of the other three monobromoalkanes that were formed together with compound X. Hence suggest the relative proportion in which the four monobromoalkanes are formed.

[3]

/7

Source: EJC Alkanes Topical Revision, Section B Q8(b)(i) to (iii)