Oxford Cambridge and RSA

GCSE Chemistry B (Twenty First Century Science)

J258/04 Depth in chemistry (Higher Tier)

Question Set 6

1. The table shows the names and chemical formulae of some alkanes and alkenes.

Number of carbon atoms (n)	Alkanes		Alkenes	
1	methane	CH_4		
2	ethane	C_2H_6	ethene	C_2H_4
3	propane	C_3H_8	propene	C_3H_6
4	butane	C_4H_{10}	butene	C_4H_8

(a) An alkene called 'methene' cannot exist.

Explain why. **[2]**

(b) All the alkenes are members of the same homologous series.

(i) How do the formulae of the alkenes show that they are from the same homologous series? **[1]**

(ii) How do the formulae of the alkanes and alkenes show that they are from different homologous series'? **[2]**

(c) The general formula for an alkane is $C_nH_{(2n+2)}$. **[1]**

Use this general formula to predict the chemical formula for an alkane which contains 50 carbon atoms.

(d) The general formula for an alkene is C_nH_{2n}.

A **general equation** for the complete combustion of alkenes uses the number of carbon atoms in the alkene to balance the equation.

general equation $C_nH_{2n} + \mathbf{1.5n}O_2 \rightarrow \mathbf{n}CO_2 + \mathbf{n}H_2O$

(i) Use the general equation to write a balanced equation for the combustion of butene,
C_4H_8.
Explain your reasoning for each part of the equation.

[3]

(ii) This general equation can be used to balance equations for the complete combustion of alkenes, but does **not** work for alkanes.

Give **one** reason why the equation does **not** work for alkanes.

[1]

Total Marks for Question Set 6: 10