ALKANE CHEMISTRY - 2

1. Give the molecular formulae of the following alkanes:

   i) an alkane with 22 carbon atoms

   _____ (1)

   ii) an alkane with 40 hydrogen atoms

   _____ (1)

2. Alkanes belong to a homologous series of compounds. By giving four properties of homologous series explain what the term *homologous series* means.

   _____

   _____

   _____

   _____

   _____

   _____ (4)

3. C_7H_{16} has several isomers including: heptane, 2-methylhexane, 2,2-dimethylpentane, 2,3-dimethylpentane, 2,2,3-trimethylbutane.

   a) Show the displayed structural formula of 2,2-dimethylpentane.

   (1)

   b) Show the structural formulae of two other isomers of formula C_7H_{16} which are not given in the list above.

   (2)

   c) Give the IUPAC names of the two isomers which you have drawn in part (b).

   _____ (2)

   d) What is the type of structural isomerism which is shown by the alkanes in this question?

   _____ (1)

4. The boiling-points of unbranched alkanes shows a gradual increase as the length of the carbon chain increases.

a) Explain why the boiling-points gradually increase.

_____

_____

_____ (2)

b) The boiling-points of pentane, methylbutane and dimethylpropane are 36°C, 28°C and 10°C respectively. The molecules are isomers of C_5H_{12}. Explain the differences in boiling-points of the three isomers.

_____

_____

_____

_____ (3)

5. Cracking is an important means of producing the molecules which are needed to manufacture motor fuels. Thermal cracking produces alkenes as an important by-product.

a) What type of reaction intermediate is produced during thermal cracking?

_____ (1)

b) State an economic reason for carrying out thermal cracking.

_____ (1)

c) A wide variety of reactions go on during the cracking of higher molecular mass alkanes. Write balanced equations for the following reactions:

i) Cracking of $C_{20}H_{42}$ to produce hexane, ethene and propene.

_____ (2)

ii) Cracking of $C_{20}H_{42}$ to produce octane and ethene

_____ (2)

iii) Cracking of $C_{16}H_{34}$ which produces ethene and propene in a 2:1 proportion.

_____ (2)

d) Why are alkenes commercially important chemicals?

_____ (1)

Total = 26 marks