

REACTIONS OF ALKANES AND ALKENES

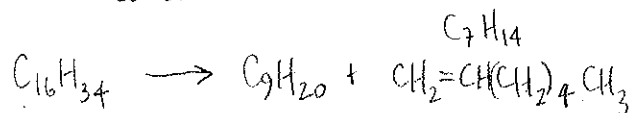
Syllabus reference 9.2.1

1 Match the statement on the left with the most appropriate answer on the right. Write the letter corresponding to this in the space provided.

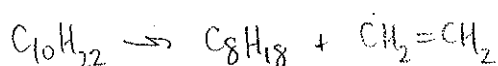
- | | | | |
|----------|------|--|---------------------------------|
| <u>f</u> | i | Raw material from which ethene is produced. | a non-polar |
| <u>C</u> | ii | Process of using a catalyst to break down high molecular weight fractions from crude oil into lower molecular weight substances. | b ethene |
| <u>g</u> | iii | Inorganic catalysts used for cracking alkanes. | c catalytic cracking |
| <u>j</u> | iv | Non-catalytic process using steam in which alkanes are decomposed into smaller alkenes. | d alkenes |
| <u>d</u> | v | Group of hydrocarbons containing a double bond. | e alkanes |
| <u>h</u> | vi | Physical property which enables hydrocarbons to be separated by fractional distillation. | f petroleum |
| <u>i</u> | vii | Type of intermolecular forces which exist between hydrocarbon molecules. | g zeolites |
| <u>a</u> | viii | Nature of hydrocarbons which means they are insoluble in water. | h boiling point |
| <u>e</u> | ix | Hydrocarbons which contain only single bonds. | i dispersion forces |
| <u>b</u> | x | Most widely used starting substance for making polymers. | j steam cracking |

2 a Write a balanced equation for the cracking of:

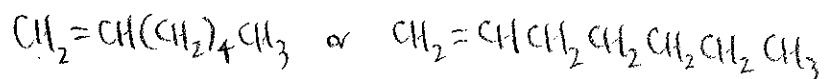
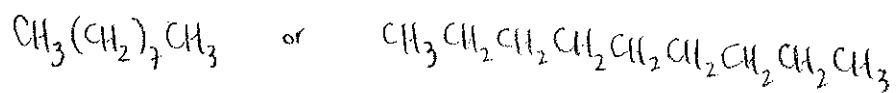
i hexadecane ($C_{16}H_{34}$) into a C_9 alkane and a C_7 alkene



ii decane ($C_{10}H_{22}$) into a C_8 alkane and C_2 alkene



b Draw structural formulae and name the products of the reactions in (a).



3 Write balanced equations for the combustion of:

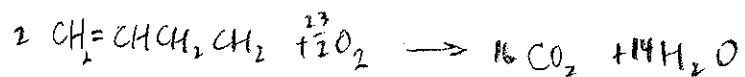
a pentane



b heptane

4 Write balanced equations for the combustion of:

a 1-butene

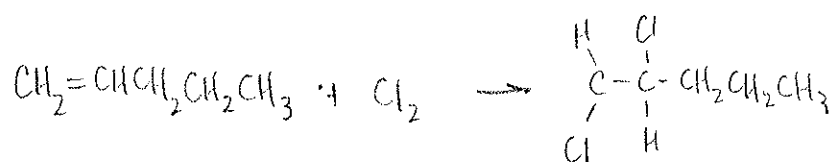


b ethene



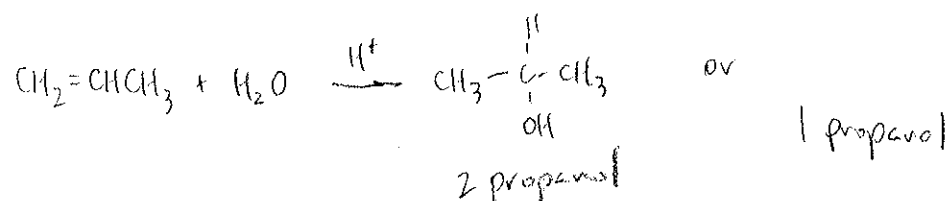
5 Write balanced equations for the following reactions, draw structural formulae and name the products.

a 1-pentene with Cl_2

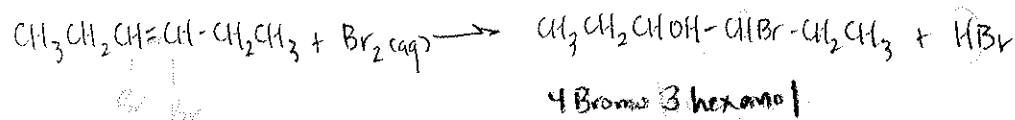


1,2-dichloropentane

b propene with H_2O (with H^+ catalyst)



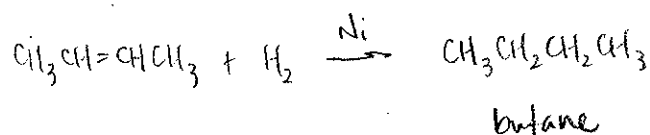
c 3-hexene with bromine water



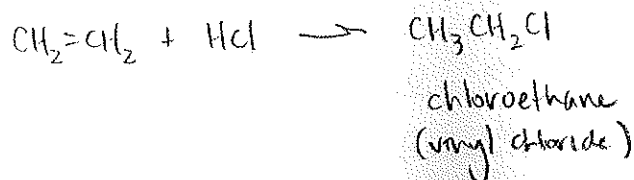
major product

(3,4-dibromohexane also \rightarrow 3 or 4-hexanol.)

d 2-butene with H_2 (with Ni catalyst)

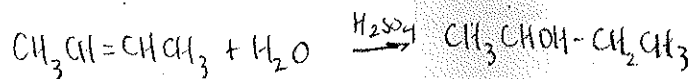


e ethene with HCl

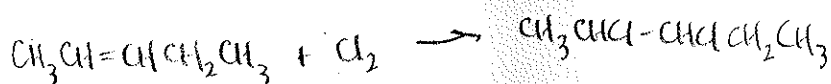


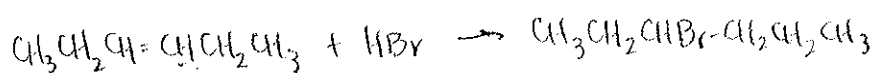
6 Suggest how the following compounds could be prepared.

a 2-butanol



b 2,3-dichloropentane





- 7 Four bottles containing clear liquids were found on the laboratory shelf but the labels had fallen off. The missing labels were found on the floor and had the names: hexene (C_6H_{12}), pentane (C_5H_{12}), water (H_2O) and ethanol ($\text{C}_2\text{H}_5\text{OH}$).

A group of chemistry students were asked to devise a series of tests to identify the contents of each of the four bottles. The students labelled the bottles A, B, C and D and conducted their tests. Here are their results.

BOTTLE	SOLUBLE IN WATER	BURNS	DECOLORISES BROMINE
A	yes	no	no
B	no	yes	yes
C	no	yes	no
D	yes	yes	no

- a Using the information from the tests, identify which bottle contained which chemical giving reasons for your decision.

A - water; soluble in H_2O , does not burn

B - hexene; insol in H_2O , alkenes decolorise Br_2

C - pentane; insol in H_2O , alkanes do not decol Br_2

D - ethanol; sol in H_2O , burns

- b Write balanced equations for the reactions which occurred.

