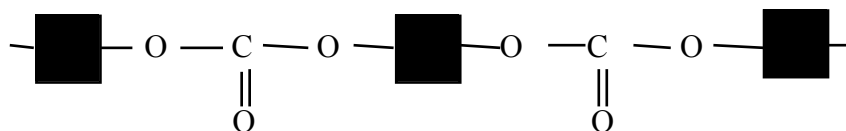


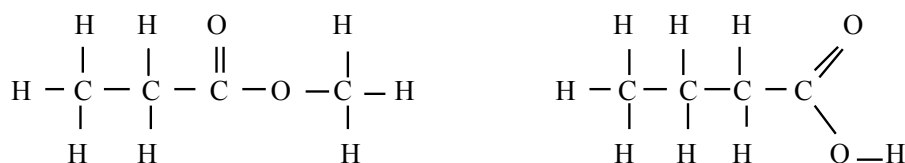
Module 7

- A1 The diagram shows part of the structure of a type of polymer called poly(carbonates).



Which of the following polymers contains a similar linkage?

- A poly(alkene)
 - B nylon
 - C polyester
 - D protein
- A2 The structures of two organic compounds are as shown below:



What are the similarities and differences between these two compounds?

Similarities

- A molecular formulas
- B structural formulas
- C molecular formulas
- D structural formulas

Differences

- relative molecular masses
- molecular formulas
- chemical reactions
- relative molecular masses

- A3 Natural gas is mainly methane, but it also contains small amounts of the next member of the same homologous series. This means that natural gas contains some _____.

- A. ethane
- B. ethene
- C. propane
- D. hydrogen

5078 Science (Chemistry & Biology)
Module 7: Organic Chemistry

A4 Which type of reaction converts ethanol into an acid?

- A. Addition
- B. Cracking
- C. Fermentation
- D. Oxidation

A5 Which formula represents a compound that reacts with ethanoic acid to produce a liquid with a sweet smell?

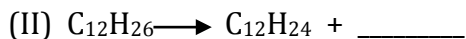
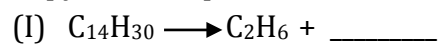
- A. $\text{CH}_3\text{COOC}_2\text{H}_5$
- B. $\text{C}_3\text{H}_7\text{OH}$
- C. $\text{C}_2\text{H}_5\text{COOH}$
- D. $\text{C}_2\text{H}_5\text{CH}=\text{CH}_2$

B1 (a) Alkenes can be made from alkanes by cracking.

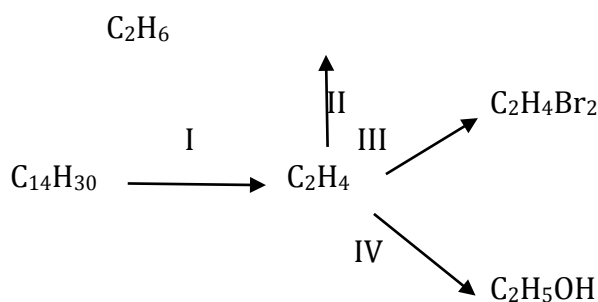
(i) What is cracking?

(ii) Apart from alkenes, name one other useful substance manufactured by cracking.

(iii) Copy and complete the following equations for cracking reactions:



(b) The hydrocarbon $\text{C}_{14}\text{H}_{30}$ is present in petroleum. The diagram below shows how a number of organic compounds can be made from $\text{C}_{14}\text{H}_{30}$.



(i) To which homologous series does $\text{C}_{14}\text{H}_{30}$ belong?

(ii) What is the formula of the next member of this series?

(iii) In which reaction do the molecules become smaller?

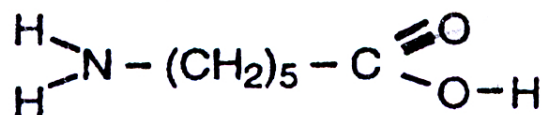
5078 Science (Chemistry & Biology)
Module 7: Organic Chemistry

- (iv) What is the name of the type of reaction that takes place in reaction II?
- (v) Name the catalyst used in reaction IV.
- (vi) What change would you expect to see if you carry out reaction III in the laboratory using excess C_2H_4 ?

B2.* Ethene is an unsaturated hydrocarbons and ethane is a saturated hydrocarbon.

- i. What is meant by the term “unsaturated”? Briefly describe a chemical test to distinguish between an unsaturated hydrocarbon and a saturated hydrocarbon.
- ii. Ethene can be made by cracking of long chain hydrocarbon molecules such as $C_{16}H_{34}$. Construct an equation to illustrate the cracking of $C_{16}H_{34}$ to make ethene and another hydrocarbon as the only products.
- iii. Propene can be polymerised to poly(propene). Draw the structure of this polymer.

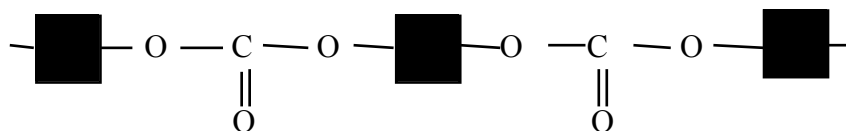
The toothbrush is usually made out of a single polymer, usually nylon. The handle is made of moulded nylon but the bristles are nylon fibres. A type of nylon can be manufactured from the monomer below.



- i. Draw the structure of part of the nylon molecule made from at least two monomer molecules.
- ii. State the type of polymer and name the linkage present in nylon.
- iii. Name one natural polymer that has the same linkage as nylon.

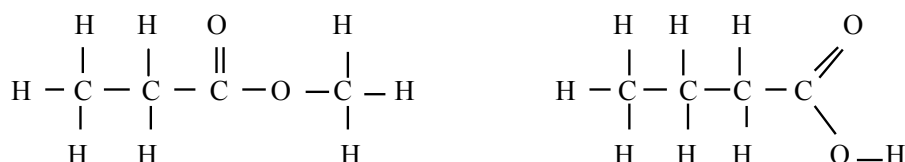
Module 7 (Solutions)

- A1 The diagram shows part of the structure of a type of polymer called poly (carbonates).



Which of the following polymers contains a similar linkage? C

- A2 The structures of two organic compounds are as shown below:



What are the similarities and differences between these two compounds?
C

- A3 Natural gas is mainly methane, but it also contains small amounts of the next member of the same homologous series. This means that natural gas contains some _____ . A
- A4 Which type of reaction converts ethanol into an acid? D
- A5 Which formula represents a compound that reacts with ethanoic acid to produce a liquid with a sweet smell? A
- B1 (a) Alkenes can be made from alkanes by cracking.

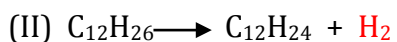
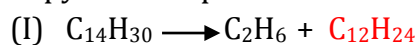
(i) What is cracking?

Breaking down of large hydrocarbon into smaller hydrocarbon with more utility.

(ii) Apart from alkenes, name one other useful substance manufactured by cracking.

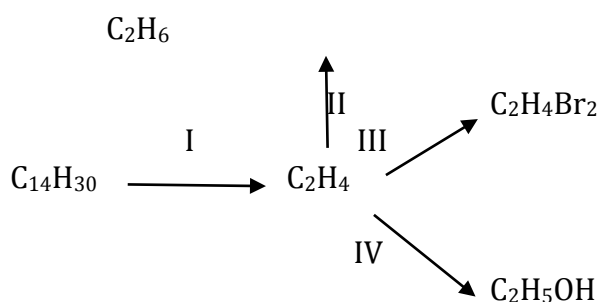
Short-chain alkane or hydrogen gas.

(iii) Copy and complete the following equations for cracking reactions:



5078 Science (Chemistry & Biology)
Module 7: Organic Chemistry

- (b) The hydrocarbon $C_{14}H_{30}$ is present in petroleum. The diagram below shows how a number of organic compounds can be made from $C_{14}H_{30}$.



- (i) To which homologous series does $C_{14}H_{30}$ belong?
Alkane
- (ii) What is the formula of the next member of this series?
 $C_{15}H_{32}$
- (iii) In which reaction do the molecules become smaller? **I**
- (iv) What is the name of the type of reaction that takes place in reaction II? **Addition reaction**
- The question is asking for type and not what reaction. Therefore, hydrogenation cannot be accepted.*
- (v) Name the catalyst used in reaction IV.
 H_3PO_4 or Phosphoric (V) acid
- (vi) What change would you expect to see if you carry out reaction III in the laboratory using excess C_2H_4 ?
Reddish-brown Br_2 decolourises (turns from brown to colourless).

5078 Science (Chemistry & Biology)
Module 7: Organic Chemistry

B2.* Ethene is an unsaturated hydrocarbons and ethane is a saturated hydrocarbon.

- i. What is meant by the term “unsaturated”? Briefly describe a chemical test to distinguish between an unsaturated hydrocarbon and a saturated hydrocarbon.

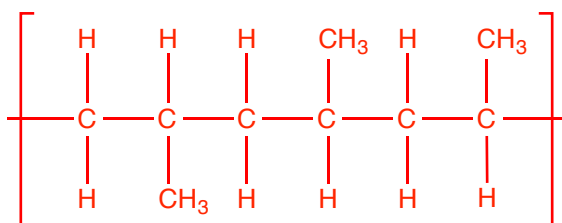
Unsaturated means that there is a double bond in the hydrocarbon compounds. A saturated and unsaturated hydrocarbon can be differentiated from Bromination.

By adding bromination to both saturated and unsaturated hydrocarbon, the reddish-brown colour will decolourise if its unsaturated hydrocarbon. It will remains reddish-brown is it is a saturated hydrocarbon.

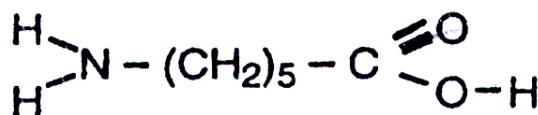
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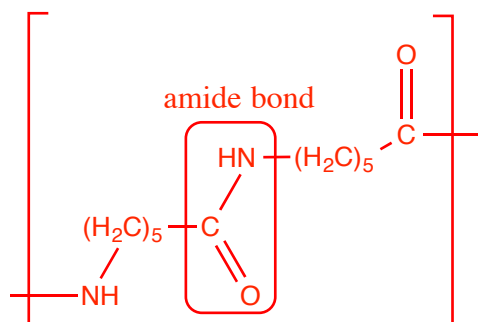


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5078 Science (Chemistry & Biology)
Module 7: Organic Chemistry

- i. Draw the structure of part of the nylon molecule made from at least two monomer molecules.



- ii. State the type of polymer and name the linkage present in nylon.
Synthetic polymer. Amide bonds.
- iii. Name one natural polymer that has the same linkage as nylon.
Proteins