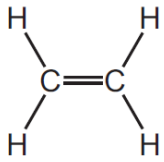
Organic Chemistry – 2021 IGCSE 0620

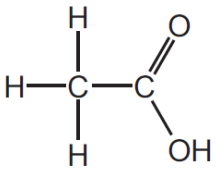
1. Nov/2021/Paper_11/No.33

Which compound is correctly named?

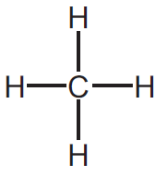
A ethane



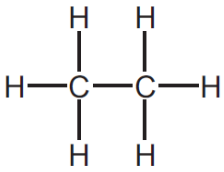
B ethanoic acid



C methene



D ethene



2. Nov/2021/Paper_11,12,13,21,22&23/No.34

Fuel X produces carbon dioxide and water when it is burned in air. So does fuel Y.

What could X and Y be?

	X	Y
A	C	H_2
B	C	C_8H_{18}
C	CH_4	H_2
D	CH_4	C_8H_{18}

3. Nov/2021/Paper_11/No.35

Which hydrocarbon is the main constituent of natural gas?

A butane

B ethane

C methane

D propane

4. Nov/2021/Paper_11/No.36

Which statements about ethene are correct?

1 It contains a C=C bond.

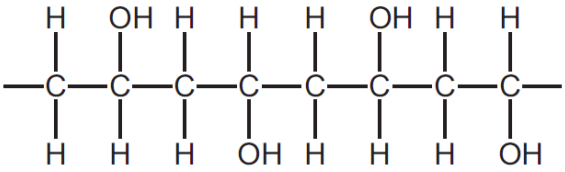
2 It does not decolourise bromine water.

3 Its molecules can join together to form long chain compounds.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

5. Nov/2021/Paper_11/No.37

Part of the structure of a very large molecule is shown.



Which term describes the small unit used to make this molecule?

A hydrocarbon

B monomer

C polymer

D saturated

6. Nov/2021/Paper_11/No.38

What is the total number of single covalent bonds in a molecule of ethanol?

A 5 **B** 6 **C** 7 **D** 8

7. Nov/2021/Paper_11/No.39

Which statement about aqueous ethanoic acid is correct?

A It reacts with magnesium to produce a salt and hydrogen.

B It reacts with sodium hydroxide to produce a salt and hydrogen.

C It reacts with ammonium salts to produce ammonia.

D It turns red litmus blue.

8. Nov/2021/Paper_11/No.40

Three statements about synthetic polymers are listed.

1 Man-made fibres are used for making clothing.

2 Plastics can cause pollution problems both on land and at sea.

3 Plastics which do not rot away are described as non-biodegradable.

Which statements are correct?

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

9. Nov/2021/Paper_12/No.33

A chemical equation for the complete combustion of methane is shown.

$$2CH_4 + zO_2 \rightarrow 2CO_2 + 4H_2O$$

What is the value of *z*?

A 2 **B** 3 **C** 4 **D** 6

10. Nov/2021/Paper_12/No.35

Which substance is **not** a fossil fuel?

A ethanol

B gasoline

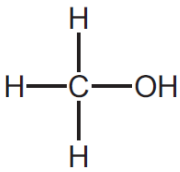
C kerosene

D methane

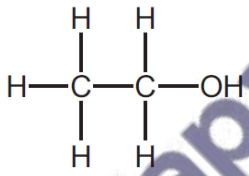
11. Nov/2021/Paper_12/No.36

Which compound belongs to a different homologous series to the others?

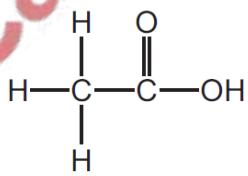
A



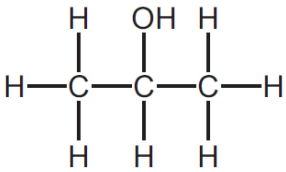
B



C



D



12. Nov/2021/Paper_12/No.37

What is a property of aqueous ethanoic acid?

A It changes red litmus blue.

B It has a deep purple colour.

C It has a pH of less than 7.

D It reacts with a metal oxide to form carbon dioxide.

13. Nov/2021/Paper_12/No.38

Which statements about unsaturated hydrocarbons are correct?

1 They contain both single and double bonds.

2 They turn aqueous bromine from colourless to brown.

3 They can be manufactured by cracking.

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

14. Nov/2021/Paper_12/No.39

Which substance is used to produce alcohol by fermentation?

A phosphoric acid

B platinum

C iron

D yeast

15. Nov/2021/Paper_12/No.40

Which statements are correct?

1 Polymers are large molecules built up from monomers.

2 Proteins are natural polymers.

3 Proteins and carbohydrates are constituents of food.

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

16. Nov/2021/Paper_13&23/No.35

What is the main constituent of natural gas?

A hydrogen

B carbon monoxide

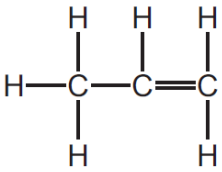
C methane

D nitrogen

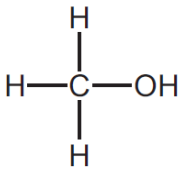
17. Nov/2021/Paper_13/No.33

The structures of three chemical compounds are shown.

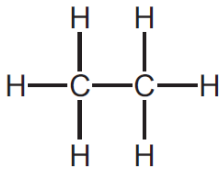
1



2



3



To which homologous series do 1, 2 and 3 belong?

	1	2	3
A	alkane	alcohol	alkene
B	alkene	alkane	alcohol
C	alkane	alkene	alcohol
D	alkene	alcohol	alkane

18. Nov/2021/Paper_13&23/No.36

Which statement describes the members of a homologous series?

A compounds with the same physical properties

B compounds containing the same functional group

C compounds containing the same number and type of bonds

D compounds obtained from the same raw material

19. Nov/2021/Paper_13/No.37

Which monomer molecules are used to make poly(ethene)?

A C_2H_4 **B** C_2H_6 **C** C_3H_6 **D** C_4H_8

20. Nov/2021/Paper_13/No.38

Ethanol is manufactured by the catalytic addition of steam to compound P.

What is P?

A ethane

B ethene

C methane

D yeast

21. Nov/2021/Paper_13/No.39

Which property is shown by aqueous ethanoic acid?

A It reacts with magnesium to form water.

B It turns red litmus blue.

C It reacts with copper to form hydrogen gas.

D It reacts with copper(II) carbonate to form carbon dioxide gas.

22. Nov/2021/Paper_13/No.40

Which statement about polymers is correct?

A All synthetic polymers rapidly break down in landfill sites.

B Nylon is a natural polymer.

C Proteins are non-biodegradable natural polymers.

D Synthetic polymers are harmful to marine life.

23. Nov/2021/Paper_21/No.33

An alkane molecule of molecular formula C_8H_{18} undergoes cracking. The equation for the reaction is shown.

$$C_8H_{18} \rightarrow Q + 2R$$

Substance R has two carbon atoms per molecule and decolourises aqueous bromine.

What is substance Q?

A butane

B butene

C ethane

D ethene

24. Nov/2021/Paper_21/No.35

Which molecule contains only single covalent bonds?

A propane

B propanoic acid

C propene

D propyl propanoate

25. Nov/2021/Paper_21/No.36

Alkanes react with chlorine to form chloroalkanes.

Which statement about the reactions of alkanes with chlorine is correct?

A Alkanes react with chlorine by addition.

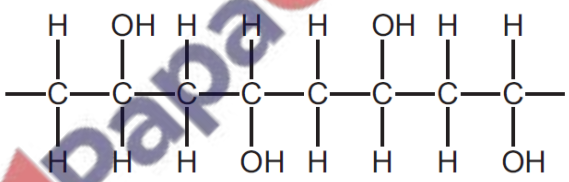
B The gaseous product turns red litmus blue.

C The chlorine atom in chloroethane is covalently bonded.

D The general formula of the chloroalkanes is $C_nH_{2n}Cl$.

26. Nov/2021/Paper_21/No.37

Part of the structure of a very large molecule is shown.



Which term describes the small unit used to make this molecule?

A hydrocarbon

B monomer

C polymer

D saturated

27. Nov/2021/Paper_21/No.38

Propene reacts with steam to form propanol.

$$C_3H_6(g) + H_2O(g) \rightarrow C_3H_7OH(g)$$

Which type of reaction takes place?

A addition

B condensation

C oxidation

D substitution

28. Nov/2021/Paper_21/No.39

Which statement about aqueous ethanoic acid is correct?

A It reacts with magnesium to produce a salt and hydrogen.

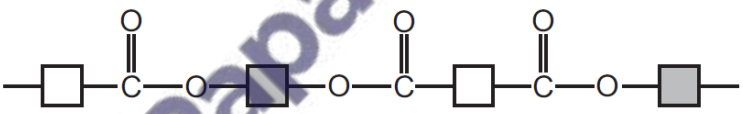
B It reacts with sodium hydroxide to produce a salt and hydrogen.

C It reacts with ammonium salts to produce ammonia.

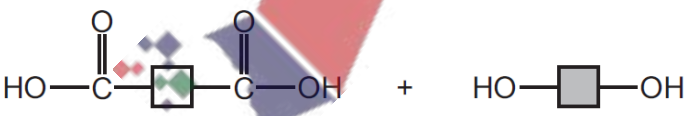
D It turns red litmus blue.

29. Nov/2021/Paper_21,22&23/No.40

The diagram shows the partial structure of *Terylene*.



From which pair of compounds is it made?

A 

B 

C 

D 

30. Nov/2021/Paper_22/No.19

Which reaction is a photochemical reaction?

A addition of bromine to propene

B esterification of ethanol and ethanoic acid

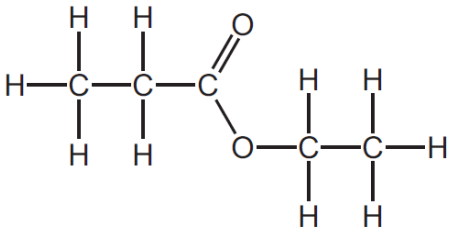
C oxidation of ethanol

D substitution of methane with chlorine

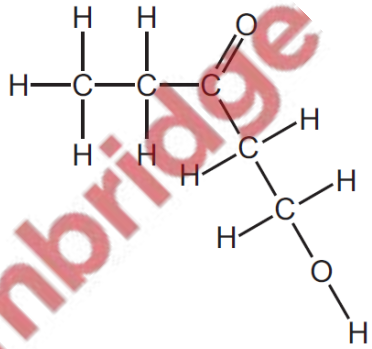
31. Nov/2021/Paper_22/No.33

What is the structure of the ester formed from ethanoic acid and propanol?

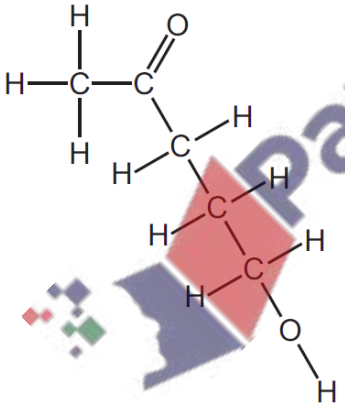
A



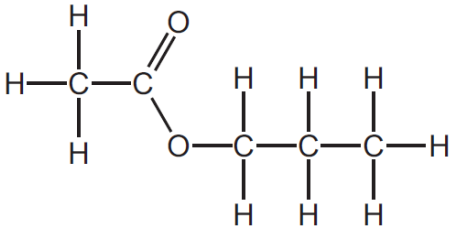
B



C

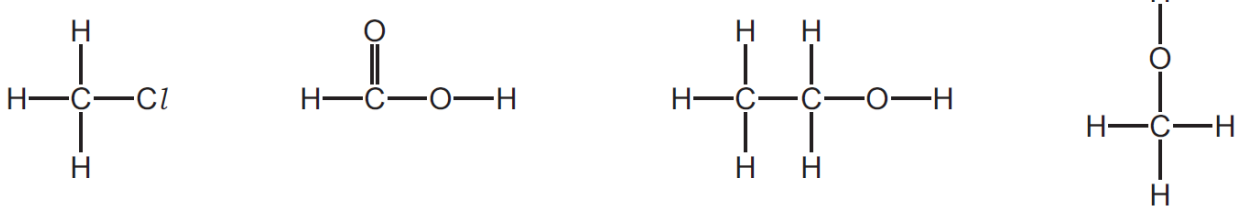


D



32. Nov/2021/Paper_22/No.35

The structures of four organic molecules are shown.



How many different homologous series are represented by these molecules?

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

33. Nov/2021/Paper_22/No.36

Which statement about ethene is correct?

A It has the chemical formula C_2H_6.

B It burns in excess oxygen producing carbon dioxide and water.

C It reacts with Br_2 to produce an orange solution.

D It reacts with oxygen to form ethanol.

34. Nov/2021/Paper_22/No.37

Ethanol is manufactured by fermentation of sugars or by catalytic hydration of ethene.

Which row states an advantage of each method?

	fermentation	hydration
A	produces purer ethanol	is a batch process
B	produces purer ethanol	is a continuous process
C	uses a renewable resource	is a batch process
D	uses a renewable resource	is a continuous process

35. Nov/2021/Paper_22/No.38

Which statements about unsaturated hydrocarbons are correct?

1 They contain both single and double bonds.

2 They turn aqueous bromine from colourless to brown.

3 They can be manufactured by cracking.

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

36. Nov/2021/Paper_22/No.39

Which polymers have the same linkage between monomer units?

A carbohydrate and polyamide

B carbohydrate and polyester

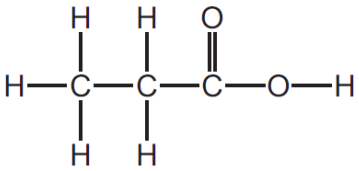
C protein and polyamide

D protein and polyester

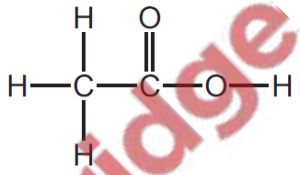
37. Nov/2021/Paper_23/No.33

What is the structure of propanol?

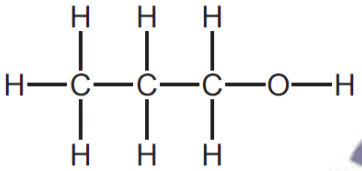
A



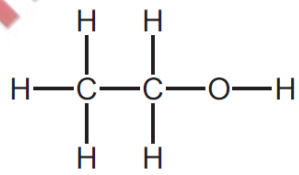
B



C

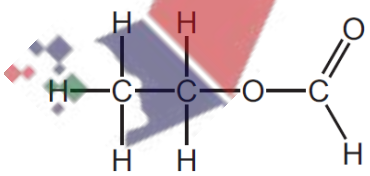


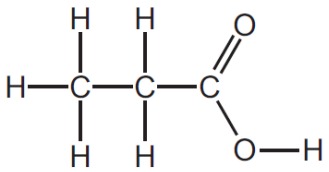
D



38. Nov/2021/Paper_23/No.37

The structures of two compounds are shown.





Which statements about these compounds are correct?

1 They have the same molecular formula.

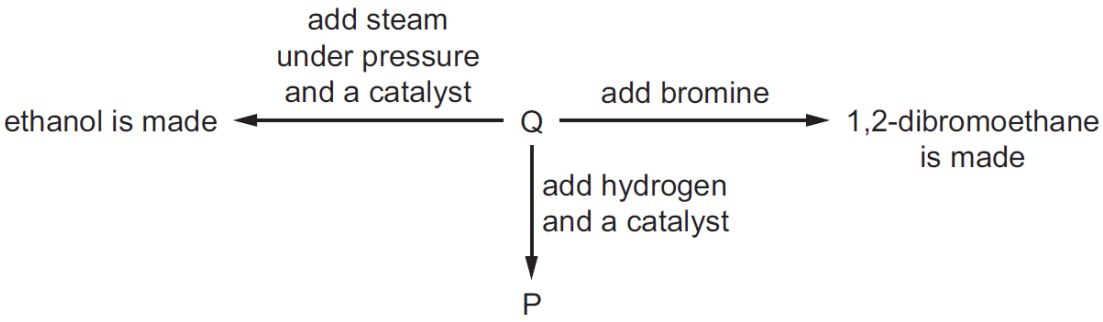
2 They have similar chemical properties.

3 They are structural isomers.

A 1 only **B** 1 and 2 **C** 2 and 3 **D** 1 and 3

39. Nov/2021/Paper_23/No.38

Some reactions of substance Q are shown.



What is P?

A ethane

B ethanoic acid

C ethene

D poly(ethene)

40. Nov/2021/Paper_23/No.39

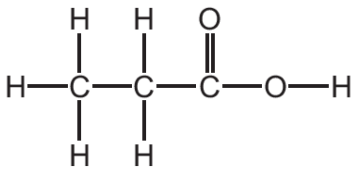
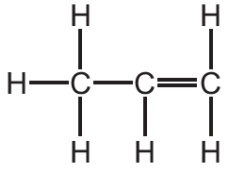
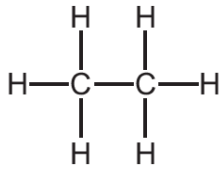
Proteins and starch are natural polymers.

Which row identifies the method of polymerisation of proteins and starch?

	proteins	starch
A	addition	addition
B	condensation	condensation
C	addition	condensation
D	condensation	addition

41. Nov/2021/Paper_31/No.5

The table shows the structures of some organic compounds.

compound	structure of compound	homologous series
G		carboxylic acid
H		
J		

(a) Complete the table by naming the homologous series.
The first one has been done for you. [2]

(b) Draw the structure of a compound containing two carbon atoms which belongs to the same homologous series as compound **H**.
Show all of the atoms and all of the bonds.

[1]

(c) State which compound in the table is an unsaturated hydrocarbon.
Explain your answer.

.....

..... [1]

(d) State which compound in the table reacts with aqueous sodium hydroxide.
Explain your answer.

.....

..... [1]

(e) State the names of the **two** compounds formed during the complete combustion of compound **J**.

..... and ..... [2]

(f) Compound **H** can be polymerised.

(i) State the general name given to the small units which join together to form a polymer.

..... [1]

(ii) *Terylene* is also a polymer.

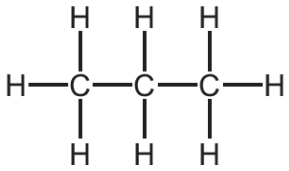
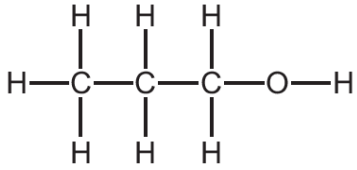
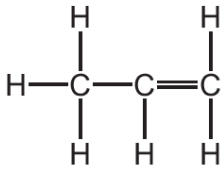
Give **one** use of *Terylene*.

..... [1]

[Total: 9]

42. Nov/2021/Paper_32/No.5

The table shows the structures of some organic compounds.

compound	structure of compound	homologous series
G		alkane
H		
J		

(a) Complete the table by naming the homologous series.
The first one has been done for you. [2]

(b) Draw the structure of a compound containing two carbon atoms which belongs to the same homologous series as compound **H**.
Show all of the atoms and all of the bonds.

[1]

(c) Describe the colour change when an excess of compound **J** is added to aqueous bromine.

from ..... to ..... [2]

(d) (i) Compound **J** can be obtained by cracking petroleum fractions.

State the conditions needed for cracking.

.....

..... [2]

(ii) Complete this sentence about cracking using a word from the list.

bitumen **hydrogen** **oxygen** **petroleum**

The chemicals manufactured by cracking include alkanes, alkenes and ..... .
[1]

(e) Compound **G** is propane.

Complete the word equation for the complete combustion of propane.

propane	+	oxygen	→	....	+	.....

[2]

(f) Compound **J** can form polymers.

(i) State the meaning of the term *polymer*.

.....

..... [2]

(ii) Nylon is also a polymer.

Give **one** use of nylon.

..... [1]

(iii) Describe **one** pollution problem caused by non-biodegradable plastics.

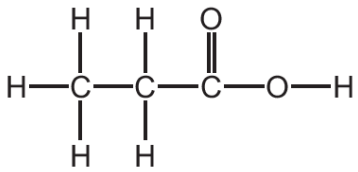
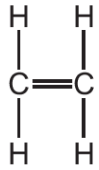
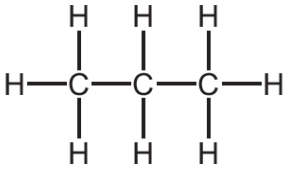
.....

..... [1]

[Total: 14]

43. Nov/2021/Paper_33/No.5

The table shows the structures of some organic compounds.

compound	structure of compound	homologous series
F		carboxylic acid
G		
H		

(a) Complete the table by naming the homologous series.
The first one has been done for you. [2]

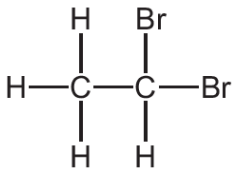
(b) Draw the structure of a compound containing two carbon atoms which belongs to the same homologous series as compound **F**.
Show all of the atoms and all of the bonds.

[1]

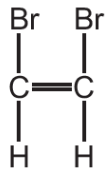
(c) Compound **G** reacts with bromine.

Choose from the structures, **P**, **Q**, **R** or **S**, the structure of the product formed.

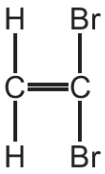
P



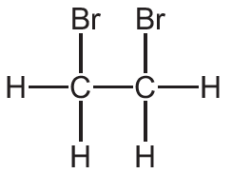
Q



R



S



..... [1]

(d) **(i)** Compound **G** can be obtained by cracking petroleum fractions.

Describe what is meant by the term *cracking*.

.....

..... [2]

(ii) Name the product of the reaction when compound **G** reacts with steam.

..... [1]

(iii) Many molecules of compound **G** can join together to form a compound with a very long chain.

Choose from the list the general name given to a compound that is formed by the addition of many small units.

Draw a circle around the correct answer.

isomer **monomer** **naphtha** **polymer** [1]

(e) State the names of the **two** compounds formed during the complete combustion of compound **H**.

..... and ..... [2]

[Total: 10]

44. Nov/2021/Paper_41/No.5

Alkenes and carboxylic acids are both families of similar compounds with similar chemical properties. Alkenes and carboxylic acids have different reactions.

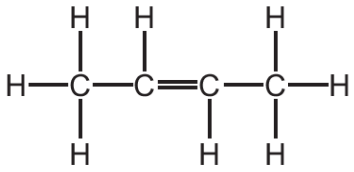
(a) State the term used for a 'family' of similar compounds.

..... [1]

(b) State the general formula of alkenes.

..... [1]

(c) The structure of but-2-ene is shown.



(i) But-2-ene reacts with aqueous bromine in an addition reaction.

Describe the colour change seen when but-2-ene is added to aqueous bromine.

from ..... to ..... [1]

(ii) State what is meant by the term *addition reaction*.

..... [1]

(iii) Write the chemical equation for the reaction between but-2-ene and bromine.

..... [2]

(iv) But-2-ene forms a polymer.

Suggest the name of the polymer formed from but-2-ene.

..... [1]

(v) Name and draw a structural isomer of but-2-ene.

Show all of the atoms and all of the bonds.

name .....

structure

[2]

(d) Butanoic acid, $CH_3CH_2CH_2COOH$, is a carboxylic acid.

(i) Deduce the empirical formula of butanoic acid.

..... [1]

(ii) Complete the chemical equation for the reaction of butanoic acid and sodium carbonate, Na_2CO_3.

$2CH_3CH_2CH_2COOH + Na_2CO_3 \rightarrow$ ..... + ... + ... [2]

(iii) Butanoic acid reacts with methanol to form an organic compound and water.

- Name the organic compound formed.

..... [1]

- Draw the structure of the organic compound formed.

Show all of the atoms and all of the bonds.

[2]

[Total: 15]

45. Nov/2021/Paper_42/No.6

Ethanol, C_2H_5OH, belongs to the homologous series called alcohols.

(a) Write the general formula of alcohols.

..... [1]

(b) Explain why ethanol **cannot** be described as a hydrocarbon.

..... [1]

(c) Ethanol can be manufactured from different substances by reaction with steam or by fermentation.

(i) Give the formula of the substance which reacts with steam to form ethanol.

..... [1]

(ii) Name a substance which will undergo fermentation to form ethanol.

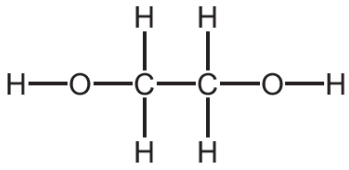
..... [1]

(d) Ethanol is a fuel.

Write the chemical equation for the complete combustion of ethanol.

..... [2]

(e) Ethane-1,2-diol has two alcohol functional groups.



One molecule of ethane-1,2-diol will react with two molecules of ethanoic acid to form molecule **X**.

X has two ester functional groups and a molecular formula of $C_6H_{10}O_4$.

(i) State the empirical formula of **X**.

..... [1]

(ii) Draw the structure of **X**.

Show all of the atoms and all of the bonds.

[2]

(iii) Name the **other** substance formed in this reaction.

..... [1]

(f) Each alcohol functional group in ethane-1,2-diol reacts with acidified potassium manganate(VII) to form a different organic compound, **Y**.

(i) Name the functional groups formed in **Y**.

..... [1]

(ii) Draw the structure of **Y**.

Show all of the atoms and all of the bonds.

[1]

[Total: 12]

46. Nov/2021/Paper_43/No.7

(a) Ethanol is a member of the homologous series of alcohols.

Give **two** characteristics of members of a homologous series.

1 .....

2 .....

[2]

(b) Ethanol can be manufactured from ethene.

Ethene can be made from long chain hydrocarbons such as decane, $C_{10}H_{22}$.

Ethene is then converted into ethanol.

(i) Name the process used to obtain ethene from long chain hydrocarbons such as decane, $C_{10}H_{22}$.

..... [1]

(ii) Complete the chemical equation to show the formation of ethene from decane, $C_{10}H_{22}$.

$$C_{10}H_{22} \rightarrow C_4H_8 + \text{.....} + \text{.....}$$ [2]

(iii) Write the chemical equation for the conversion of ethene into ethanol.

..... [1]

(iv) Name the type of reaction occurring when ethene is converted into ethanol.

..... [1]

(v) Give **one** condition for the reaction in which ethene is converted into ethanol.

..... [1]

(c) Ethanol can also be produced by fermentation of carbohydrates such as glucose.

Give **two** advantages of manufacturing ethanol by fermentation compared to manufacturing ethanol from ethene.

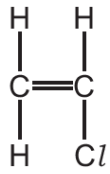
1 .....

2 .....

[2]

(d) (i) Under certain conditions ethene can react with chlorine to produce chloroethene.

The structure of chloroethene is shown.



The equation for the chemical reaction is shown.

$$C_2H_4 + Cl_2 \rightarrow C_2H_3Cl + HCl$$

State the type of chemical reaction between ethene and chlorine that this equation shows.

..... [1]

(ii) Chloroethene monomers can be converted into a polymer called poly(chloroethene).

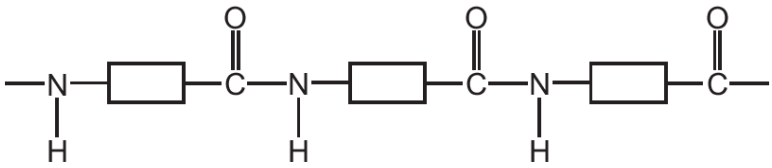
State the type of polymerisation that produces poly(chloroethene) from chloroethene.

..... [1]

(iii) Draw a section of the poly(chloroethene) molecule made from **two** monomer molecules.

[2]

(e) The structure of part of a polymer is shown.



This polymer is made from one type of monomer only.

Complete the diagram to show the structure of the monomer used to produce this polymer. Show all of the atoms and all of the bonds in the functional groups.

[2]

[Total: 16]