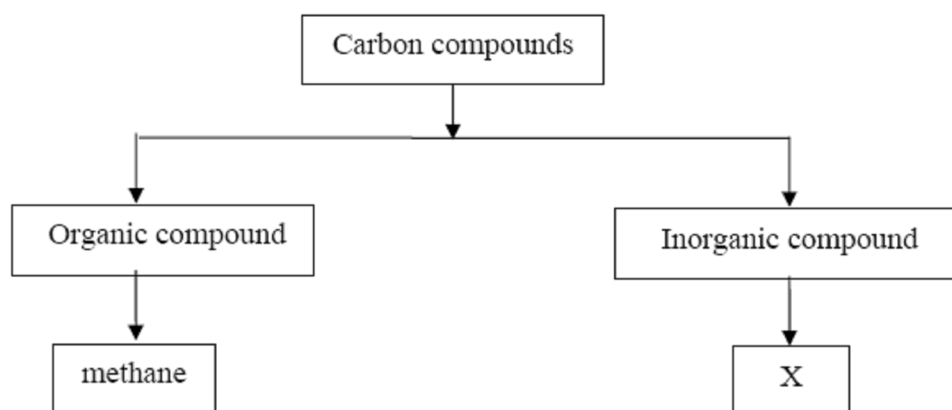


General

[MRSM05–15] The chart shows the classification of carbon compounds.



X is

- A carbon dioxide
- B ethanoic acid
- C methanol
- D glucose

[SBPTrial08-09] Which of the following compounds is an organic compound?

- A Calcium carbonate, CaCO_3
- B Carbonic acid, H_2CO_3
- C Carbon dioxide, CO_2
- D Glucose, $\text{C}_6\text{H}_{12}\text{O}_6$

[SPM03-10] A hydrocarbon is a chemical compound consisting of

- A carbon and oxygen only
- B carbon and hydrogen only
- C carbon, hydrogen and oxygen only
- D carbon, hydrogen, oxygen and nitrogen only

[MRSM11-14] Which of the following substances is a hydrocarbon?

- A Pentanol
- B 2 - methylbutane
- C Methanoic acid
- D Ethyl ethanoate

[SPM06-15] Which of the following is a saturated hydrocarbon?

- A Alkane
- B Alkene
- C Alcohol
- D Carboxylic acid

[MRSM07-12] Which of the following substance is found in crude oil?

- A Ethanoic acid
- B Polythene
- C Ethanol
- D Butane

[SPM05-16] Which of the following is the structural formula of an unsaturated hydrocarbon?

- | | |
|---|--|
| <p>A</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & & \\ & & & & & & \\ \text{H} & - \text{C} & = \text{C} & - \text{C} & - \text{H} & & \\ & & & & & & \\ & & & \text{H} & & & \end{array}$ | <p>B</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{OH} & & \\ & & & & & & \\ & \text{H} & \text{H} & & & & \end{array}$ |
| <p>C</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & = \text{C} & - \text{H} & & \\ & & & & & & \\ & \text{Cl} & & & & & \end{array}$ | <p>D</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{H} & & \\ & & & & & & \\ & \text{H} & \text{H} & \text{H} & & & \end{array}$ |

[SBPmidYearF508-11] Which of the following structural formulae shows an unsaturated hydrocarbon?

- | | |
|---|--|
| <p>A</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & \text{H} & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{H} & \\ & & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & & \end{array}$ | <p>B</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{H} & & \\ & & & & & & \\ & \text{O} & \text{H} & \text{H} & & & \\ & & & & & & \\ & \text{H} & & & & & \end{array}$ |
| <p>C</p> $\text{CH}_3 - \text{CH}_2 - \overset{\text{O}}{\parallel} \text{C} - \text{O} - \text{CH}_3$ | <p>D</p> $\begin{array}{ccccccc} & & \text{H} & & & & \\ & & & & & & \\ & & \text{H} & - \text{C} & - \text{H} & & \\ & & & & & & \\ & \text{H} & & & & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & = \text{C} & - \text{C} & - \text{H} & \\ & & & & & & \\ & \text{H} & & & & \text{H} & \end{array}$ |

Alkane

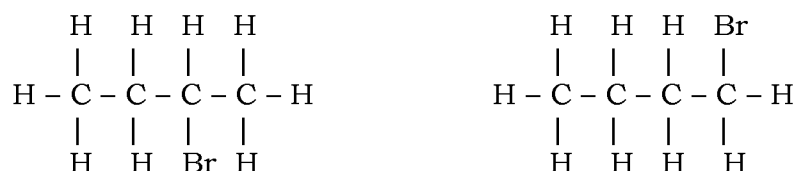
[SPM08-12] What is the general formula for an alkane?

- A C_nH_{2n}
- B $\text{C}_n\text{H}_{2n+2}$
- C $\text{C}_n\text{H}_{2n+1}\text{OH}$
- D $\text{C}_n\text{H}_{2n+1}\text{COOH}$

[SPM11-02] Which compound is a saturated hydrocarbon?

- A Propene
- B Propane
- C Propanol
- D Chloropropane

[SPM05-14] The structural formulae of two isomers are as follows.



Which of the following names can be used for both isomers?

- A bromoethane
- B bromopropane
- C bromobutane
- D bromopentane

[SBPtrial10-22] Diagram 5 represents the structural formula of but-1-ene.

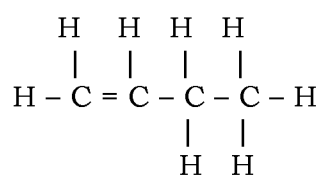
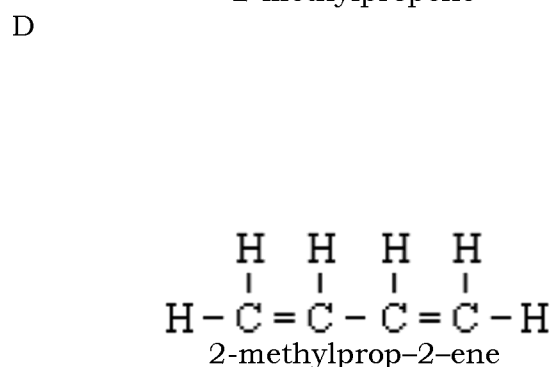
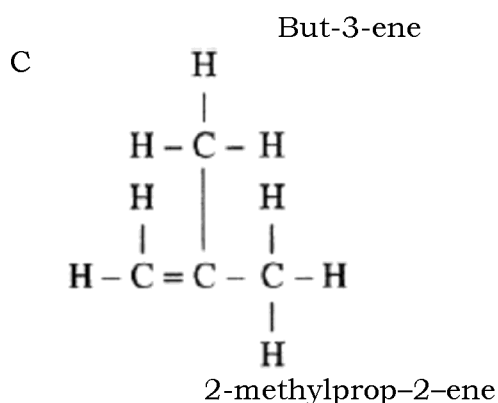
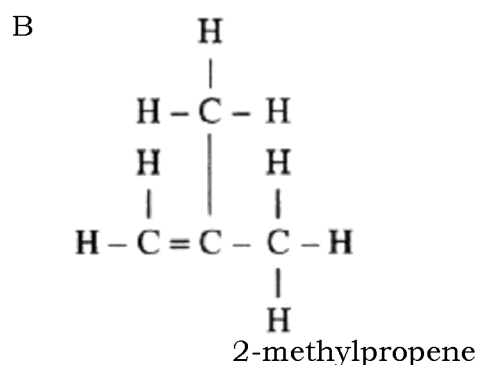
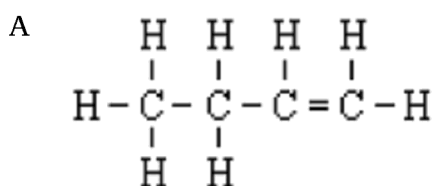


Diagram 5

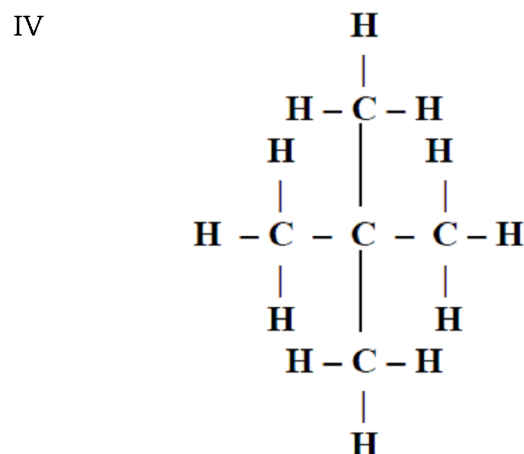
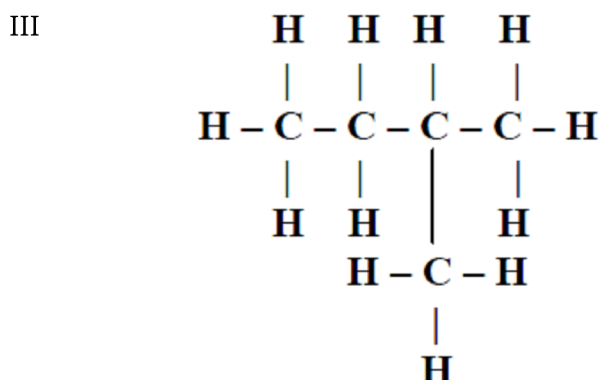
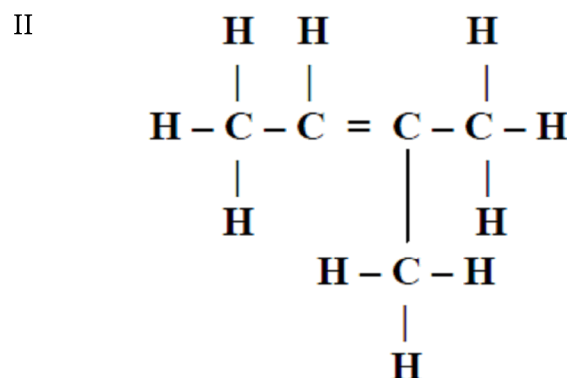
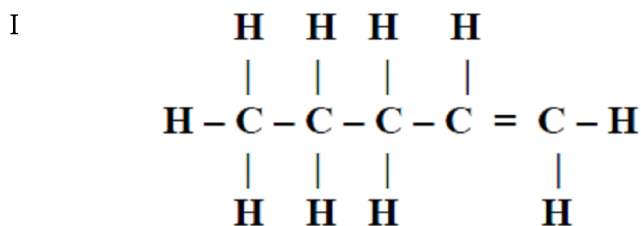
Which of the following is the structural formula and name for an isomer of but-1-ene?



[SPM10-37] Which statement is correct about alkanes?

- A Undergo polymerization reaction
- B Undergo hydrogenation reaction
- C Undergo substitution reaction
- D Undergo hydration reaction

[SBPtrial11-36] Which of the following are isomers of pentane



- A I and II
 B I and III
 C III and IV
 D II, III and IV

[SBPtrial10-11] Diagram 3 shows the structural formulae of compound X

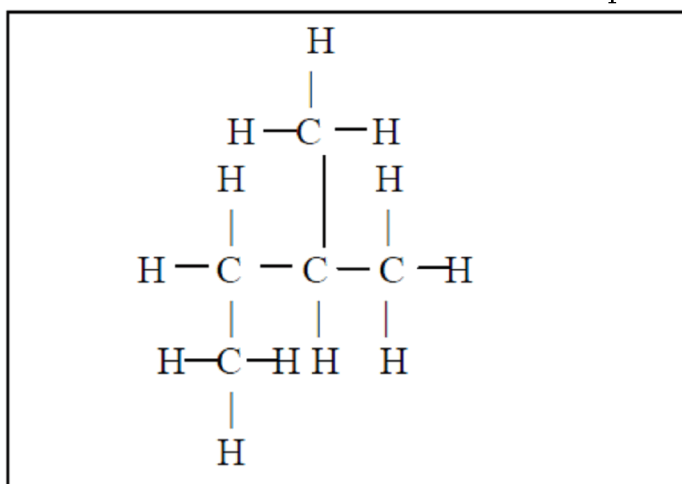


Diagram 3

Which of the following is the IUPAC name of this alkane?

- A 2-methylbutane
 B 3-methylbutane
 C 2,4- dimethylpropane
 D 1,2-dimethylpropane

[SBPtrial11-13] Diagram 4 shows the structural formula of an organic compound.

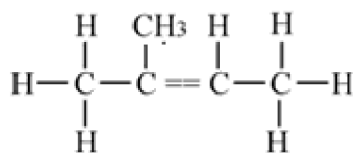
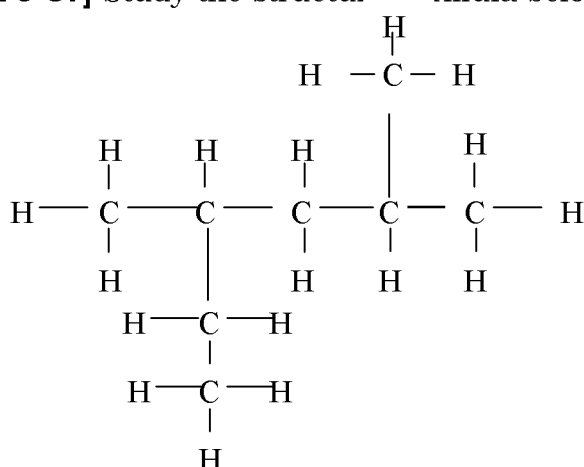


Diagram 4

What is the IUPAC name for this compound?

- A 2-pentene
- B 2-methyl-1-butene
- C 2-methyl-2-butene
- D 3-methyl-3-butene

[SBPmidYearF5-37] Study the structural formula below:



Based on the IUPAC system, what is the name of the compound having this structural formula?

- A 2,4,4- trimethylpentane
- B 2,4,4- trimethyloctane
- C 2-ethyl-4-methylpentane
- D 2,4-dimethylhexane

[MRSM03-44]

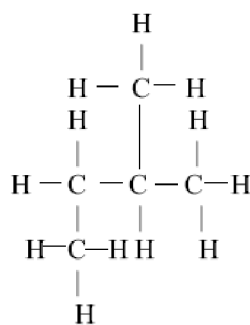
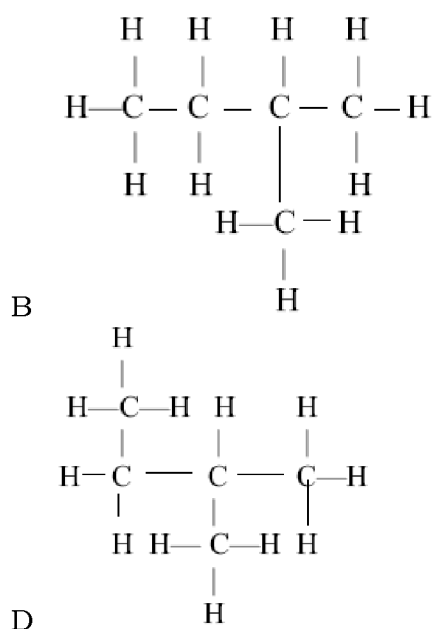
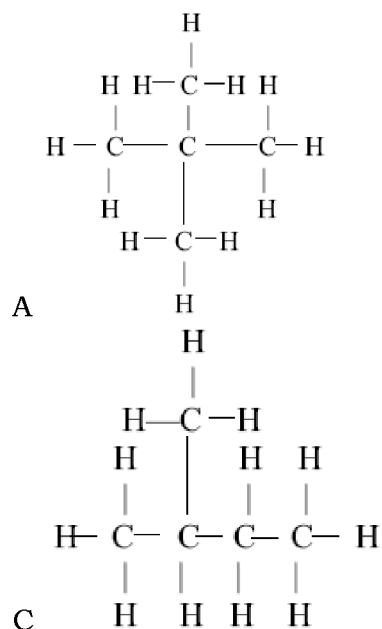
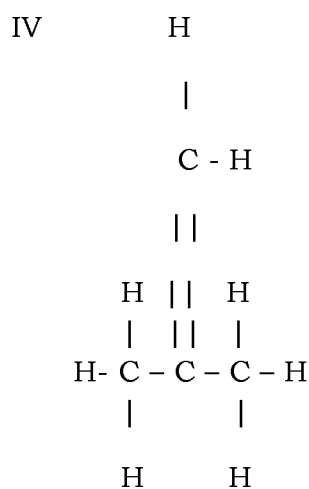
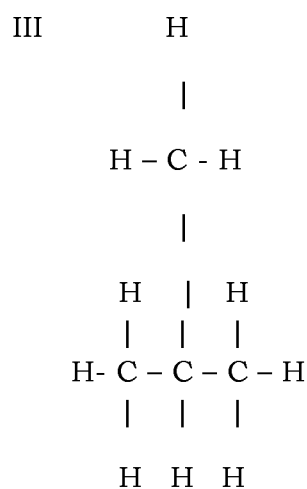
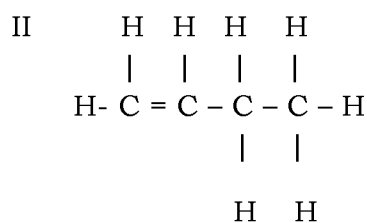
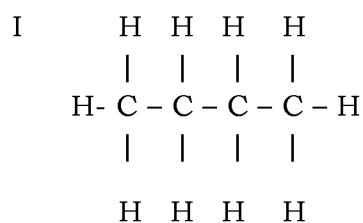


Figure 13

Which of the following is an isomer of the structure in Figure 13?

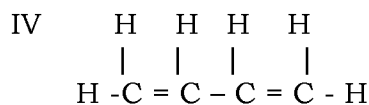
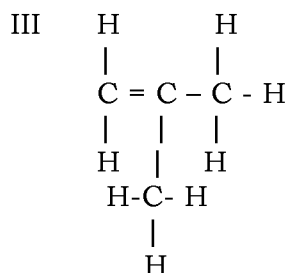
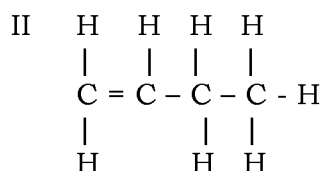
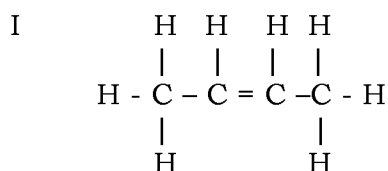


[SPM10-34] Which structural formulae are isomers of butane?



- A I and II
 B I and III
 C II and IV
 D III and IV

[SPM03-36] Which of the following are isomers of butene?



- A I and III only
 B II and IV only
 C I, II and III only
 D I, II, III and IV

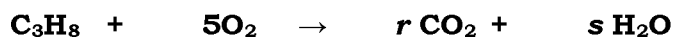
[MRSM 04 – 44] The equation below represents the combustion of ethane in excess oxygen.



What is the value of a, b, c and d?

	a	b	c	d
A	1	7	2	3
B	2	7	4	6
C	1	1	2	3
D	2	7	2	3

[MRSM07-22] When propane is burned in excess oxygen, carbon dioxide and water are formed and is represented by the equation



What are the values of r and s that balances the equation?

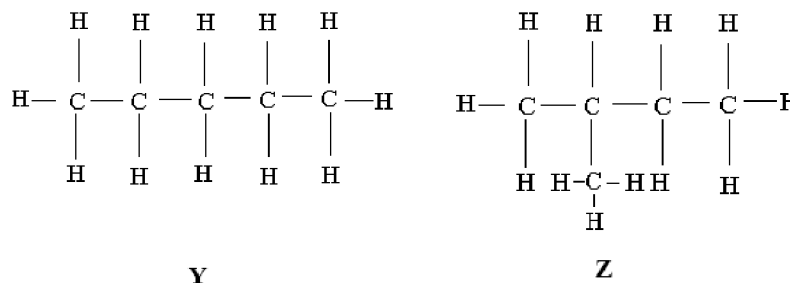
	r	s
A	1	3
B	1	5
C	3	4
D	3	8

[MRSM03-35] There is a gradual change of the physical properties of alkanes with the increases in their molecular mass. According to the above statement, butane is different from hexane because hexane has

- I higher heats of combustion
 II higher combustibility
 III higher viscosity
 IV higher boiling point

- A I and II only
 B II and III only
 C I, III and IV only
 D I, II, III and IV

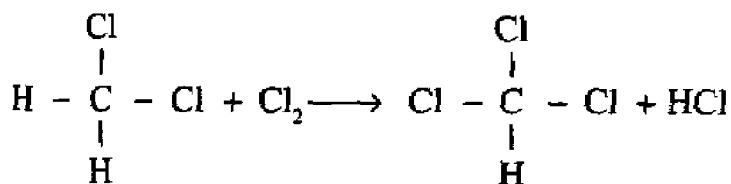
[MRSM05–16] The diagram shows structural formulae of substances Y and Z.



Substances Y and Z have similar

- A boiling points
 B molecular formulae
 C structural formulae
 D IUPAC names

[SBPTrial07-23] The equation below shows a chemical reaction.



Based on the equation given, name the reaction.

- A Hydrogenation
 B Polymerization
 C Halogenation
 D Substitution

[MRSM03-08] Which of the following processes can be used to change ethene to ethanol?

- A Hydrogenation
 B Hydration
 C Neutralization
 D Fermentation

[MRSM06-07] Propane and propene are members of different homologous series. Which of the following is the general formulae representing the two compounds?

- | | Propane | Propene |
|---|-------------------------------|-----------------------------|
| A | C_nH_{2n} | $\text{C}_n\text{H}_{2n+2}$ |
| B | $\text{C}_n\text{H}_{2n+2}$ | C_nH_{2n} |
| C | $\text{C}_{2n}\text{H}_{n+2}$ | $\text{C}_n\text{H}_{2n+1}$ |
| D | $\text{C}_n\text{H}_{2n+1}$ | $\text{C}_n\text{H}_{2n+2}$ |

[SBPmidYearF5-38] Butane has some similar characteristics with butene. The characteristics are

- I Exist as gas at room temperature.
 II Decolourise the purple colour of acidified potassium manganate(VII).
 III Cannot dissolve in water.
 IV Burn in excess air to produce a gas that turns limewater cloudy.
- A I and III only
 B II and IV only
 C I, III and IV only
 D I, II, III and IV

[SPM03-45] Which of the following hydrocarbons is most suitable to be used as cooking gas?
 [Relative atomic mass: H=1 ; C=12]

- A C_3H_6
 B C_4H_8
 C C_4H_{10}
 D C_6H_6

[SPM04-10] Which of the following substance can be used to differentiate ethene from ethane?

- A lime water
 B bromine water
 C dilute sulphuric acid
 D sodium hydroxide solution

[SPM07-35] Diagram 7 shows the structural formulae of compound X and compound Y.



Diagram 7

Which of the following are the correct properties for compound X and compound Y?

	X	Y
A	Soluble in dilute acid	Soluble in water
B	Reacts with bromine	Does not react with bromine
C	Does not react with acidified potassium manganate(VII)	Reacts with acidified potassium manganate (VII)
D	Produces much soot when it burns	Does not produce soot when it burns

Alkene

[SPM11-44] Diagram 11 shows the structural formula of a compound.

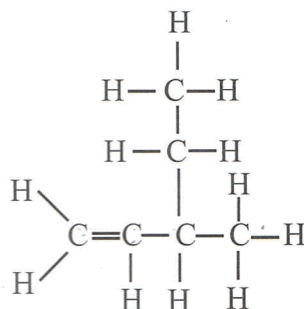


Diagram 11

What is the name of the compound?

- A 2-ethylbut-1-ene
- B 2-ethylbut-4-ene
- C 3-methylpent-4-ene
- D 3-methylpent-1-ene

[MRSM04-09] Figure 5 shows the structural formula for a hydrocarbon compound.

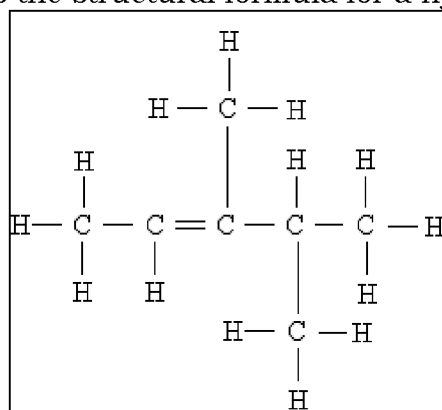
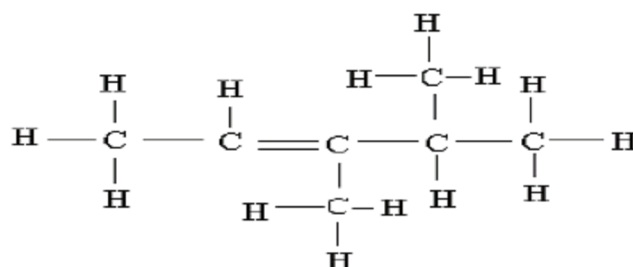


FIGURE 5

Which of the following IUPAC nomenclature represents the compound in Figure 5?

- A 3, 4 - dimethyl pent-2-ene
- B 2, 3 - dimethyl pent-3-ene
- C 1,2,3 - trimethyl but-1-ene
- D 3 - propyl but-2-ene

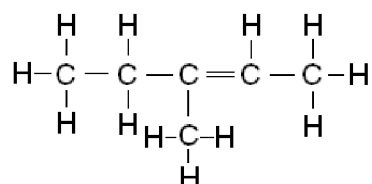
[MRSM 05-30] The diagram shows structural formula of a carbon compound.



IUPAC name for this compound is

- A 3,4-methylpent-3-ene
- B 2,3-dimethylpent-2-ene
- C 2,3-dimethylpent-3-ene
- D 3,4-dimethylpent-2-ene

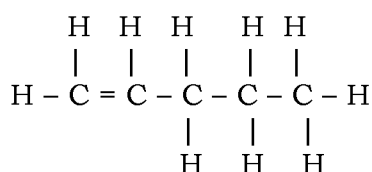
[MRSM09-32] Diagram 13 shows the structural formula of a compound.



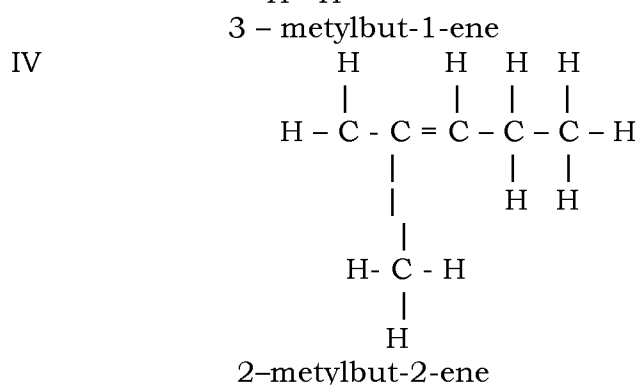
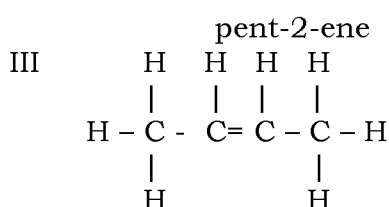
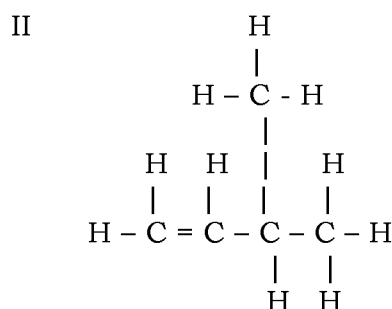
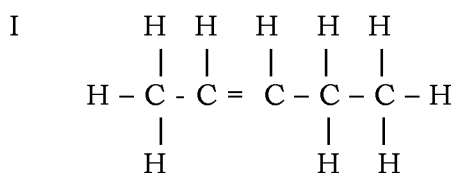
What is the name of the compound?

- A 1,2- dimethylbutene
- B 3-methylpent-3-ene
- C 3-methylpent-2-ene
- D 3,4-dimethylbut-2-ene

[SPM04-28] The figure shows the structural formula of pent-1-ene.



Which of the following are structural formulae and correct names for isomers of pent-1-ene?



Pent-3-ene

- A I and IV only
- B II and III only
- C I, II and IV only
- D I, II, III and IV

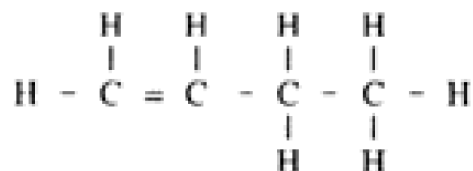
[SPM10-38] When but-2-ene is shaken with bromide water, the brown bromine water is decolourised. What is the product of this reaction?

- A 1,2-dibromobutene
- B 2,3-dibromobutene
- C 1,2-dibromobutane
- D 2,3-dibromobutane

[SBPTrial08-36] C₄H₈ is the molecular formula for isomers X and Y.
Which of the following statements is true of isomers X and Y?

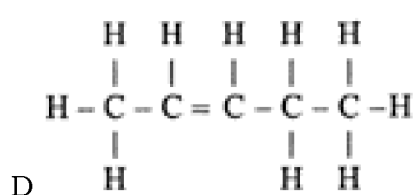
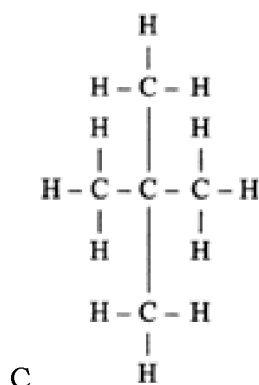
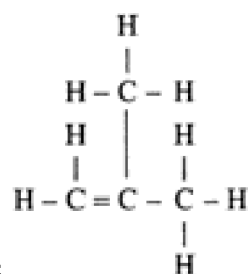
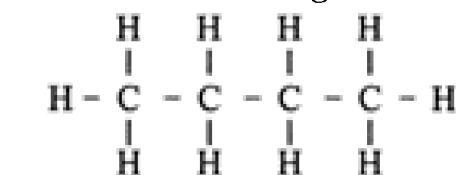
- A X and Y have similar molecular structure
- B X and Y have similar chemical properties
- C X and Y have different relative molecular mass
- D X and Y have similar physical properties

[SBPmidYearF508-47] The diagram shows the structural formula of compound X.

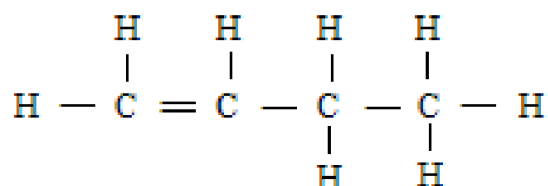


Compound X

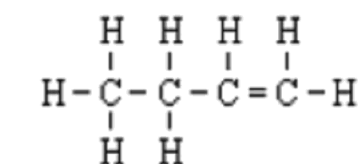
Which of the following is an isomer of X?



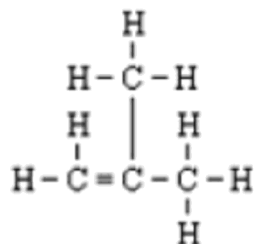
[MRSM07-15] Diagram 5 represents the structural formula of but-1-ene.



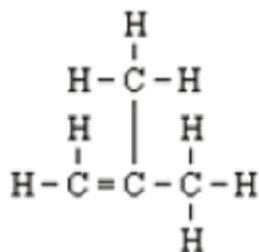
Which of the following is the structural formula and name for an isomer of but-1-ene?



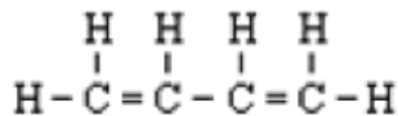
But-3-ene



2-methylprop-1-ene



C 2-methylprop – 2 - ene



D 2-methylprop – 2 - ene

[SBPTrial09-35] Diagram 13 shows the structural formula of pent-1-ene.

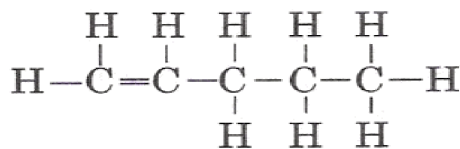
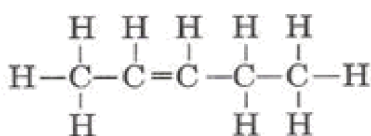
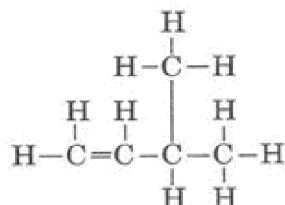


Diagram 13

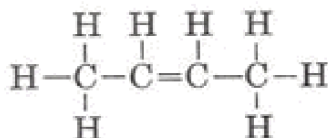
Which of the following are the structural formulae and names for the isomers of pent-1-ene?



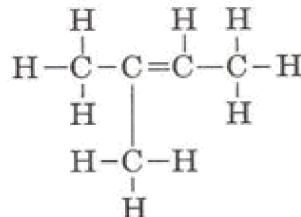
I Pent-2-ene



II 3-methylbut-1-ene



III Pent-3-ene



IV 2-methylbut-2-ene

- A I and IV
 B II and III
 C I, II and IV
 D I, II, III and IV

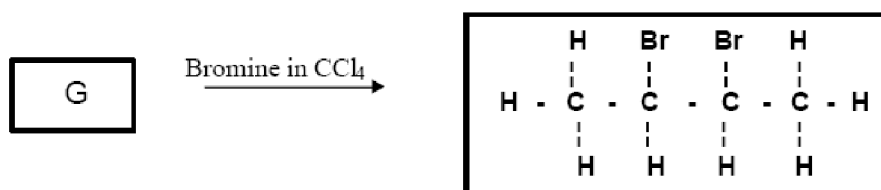
[SPM07-14] What is the product formed when ethene is burned in air?

- A Ethane and water
 B Carbon and hydrogen
 C Carbon dioxide and water
 D Carbon dioxide and hydrogen

[SPM07-15] Butene can be transformed to butane by the process of

- A Fermentation
 B oxidation
 C dehydration
 D hydrogenation

[MRS06-17] The diagram shows the chemical change that occurs to compound G.



Which of the following is compound G?

- A n-butane
- B But-1-ene
- C But-2-ene
- D Butan-2-ol

[SPM05-29 | SBPTrial09-24] The following is the equation that represents the reaction between propene and chlorine.



Which of the following is the structural formula of Q?

- A $\begin{array}{c} \text{H} \ \text{H} \ \text{H} \\ | \ \ | \ \ | \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{Cl} \\ | \ \ | \ \ | \\ \text{H} \ \ \text{H} \ \text{Cl} \end{array}$ B $\begin{array}{c} \text{H} \ \text{H} \ \text{H} \\ | \ \ | \ \ | \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\ | \ \ | \ \ | \\ \text{H} \ \text{Cl} \ \text{Cl} \end{array}$
- C $\begin{array}{c} \text{H} \ \text{Cl} \ \text{Cl} \\ | \ \ | \ \ | \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\ | \ \ | \ \ | \\ \text{Cl} \ \text{H} \ \text{Cl} \end{array}$ D $\begin{array}{c} \text{H} \ \text{H} \ \text{H} \\ | \ \ | \ \ | \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\ | \ \ | \ \ | \\ \text{H} \ \ \text{H} \ \text{Cl} \end{array}$

[MRS07-16] Diagram 6 shows the chemical changes that occur to compound G.

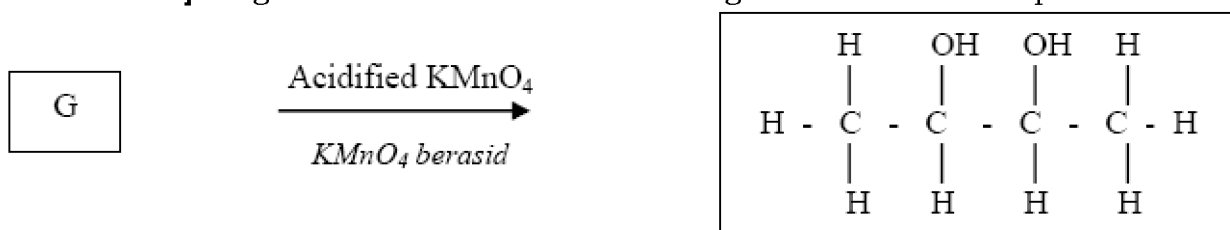


DIAGRAM 6

Which of the following is compound G?

- A n-butane
- B But-1-ene
- C But-2-ene
- D Butan-2-ol

[SBPdiag06-16] Which of the following pairs is correct monomer for the polymer?

	Monomer	Polymer
A	Ethene	Polythene
B	Glucose	Protein
C	Amino acid	Carbohydrate
D	Isopropene	Nylon

[SBPdiag08-24] Table 2 shows the pairs of polymer and monomer.

	Polymer	Monomer
I	Carbohydrate	Glucose
II	Polyvinyl chloride	Chloroethene
III	Protein	Amino acid
IV	Natural rubber	Neoprene

TABLE 2

Which of the following pairs of polymer and monomer are correct?

- A I and II only
 B I, II and III only
 C II, III and IV only
 D I, II, III and IV

[MRSM07-28] Polymerization occurs when many small molecules combined to form a long chained molecule (polymer). Diagram 16 shows the structure of a small molecule.

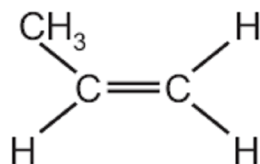
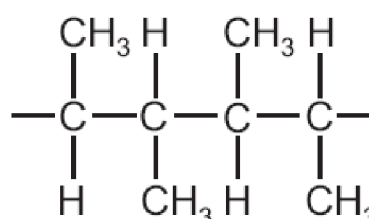
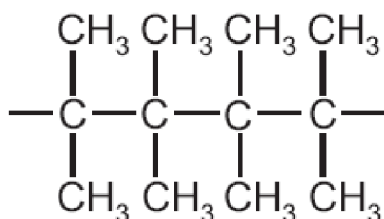
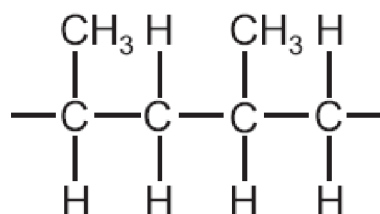
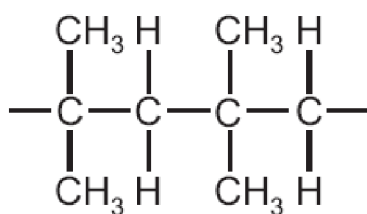


Diagram 16

Which of the following represents the structure of a polymer formed when these small molecules are linked together?



[SBPtrial11-21] Diagram 7 shows the structural formula of a polymer

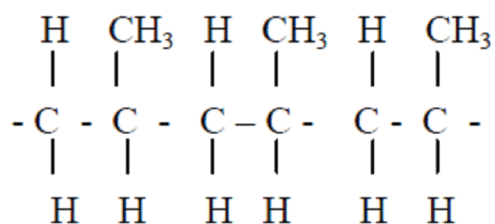


Diagram 7

Which of the following is the structural formula for its monomer?

- A
$$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{CH}_3 - \text{C} - \text{C} - \text{H} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- B
$$\begin{array}{c}
 \text{H} - \text{C} = \text{C} - \text{CH}_3 \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- C
$$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{H} - \text{C} = \text{C} - \text{H} \\
 | \quad | \\
 \text{CH}_3 \quad \text{CH}_3
 \end{array}$$
- D
$$\begin{array}{c}
 \text{H} \\
 | \\
 \text{H} - \text{C} = \text{C} - \text{C} - \text{H} \\
 | \quad | \quad | \\
 \text{CH}_3 \quad \text{H} \quad \text{H}
 \end{array}$$

[MRSM07-46] Ethene reacts with steam in the presence of a suitable catalyst. What is the structural formula of the compound formed?

- A
$$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{H} - \text{C} - \text{C} - \text{O} - \text{H} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- B
$$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{H} - \text{O} - \text{C} - \text{C} - \text{O} - \text{H} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- C
$$\begin{array}{c}
 \text{H} \\
 | \\
 \text{H} - \text{C} - \text{C} \\
 | \quad // \quad \backslash \\
 \text{H} \quad \text{O} \quad \text{O} - \text{H}
 \end{array}$$
- D
$$\begin{array}{c}
 \text{O} \quad \text{O} \\
 // \quad // \\
 \text{H} - \text{O} - \text{C} - \text{C} - \text{O} - \text{H} \\
 \backslash \quad / \\
 \text{O} \quad \text{O}
 \end{array}$$

[MRSM09-28] Diagram 10 shows the structure for a part of a polymer.

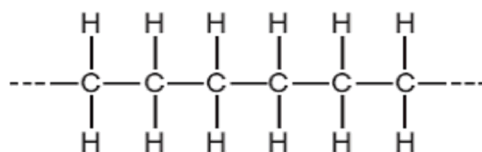
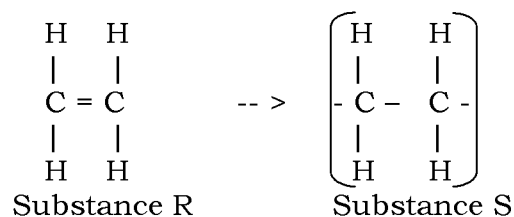


Diagram 10

Which of the following compound is the monomer for the polymer?

- A C₆H₁₂
 B C₆H₁₄
 C C₂H₄
 D C₂H₆

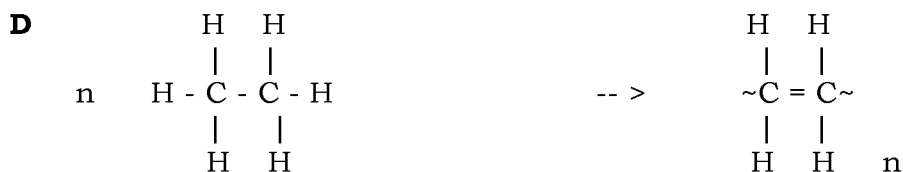
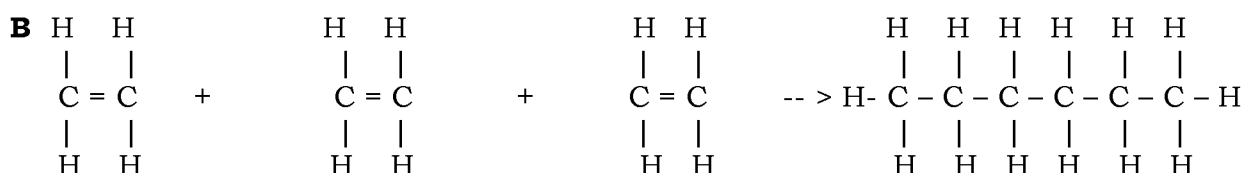
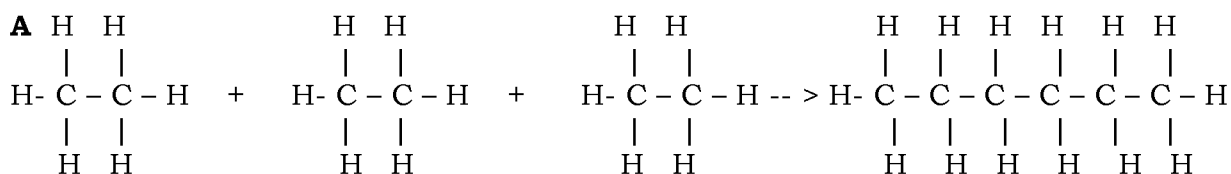
[SPM05-11] The diagram shows a polymerization process.



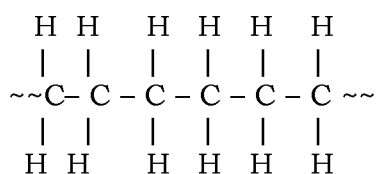
Which of the following properties is identical for substance R and S?

- A melting point
 B density
 C relative molecular mass
 D percentage composition

[SPM07-11] Polyethene is a polymer that is formed from the combination of ethene molecules. Which of the following represents the process of the formation of polyethene?



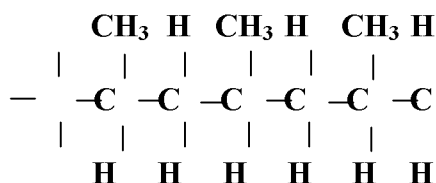
[SPM06-28] Diagram 10 shows the structural formula of a polymer.



What is the structural formula of its monomer?

- A $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{C} = \text{C} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
- B $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
- C $\begin{array}{c} \text{CH}_3 \quad \text{H} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ \text{H} \quad \text{CH}_3 \end{array}$
- D. $\begin{array}{c} \text{CH}_3 \quad \text{H} \\ | \quad | \\ \text{C} = \text{C} \\ | \quad | \\ \text{H} \quad \text{CH}_3 \end{array}$

[SBPTrial07-20] The diagram shows part of a polymer molecule



Which is its monomer?

- A $\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$
- B $\begin{array}{c} \text{CH}_3 \quad \text{H} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
- C $\begin{array}{c} \text{CH}_3 \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$
- D $\begin{array}{c} \text{CH}_3 \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \diagdown \\ \text{H} \quad \quad \text{CH}_3 \end{array}$

[SBPTrial08-22] Diagram 7 shows molecular structure of a polymer.

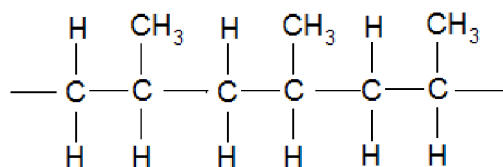
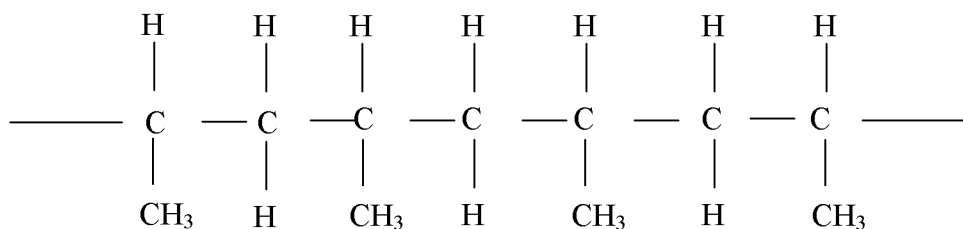


Diagram 7

What is the name of the monomer of the polymer in the diagram?

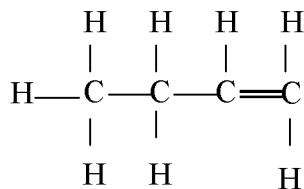
- A Ethene
B Butene
C Propene
D Chloroethene

[SBPmidYearF5-35] The diagram below is a structural formula of a polymer.

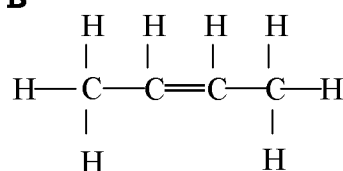


What is the structural formula of the monomer for the above polymer?

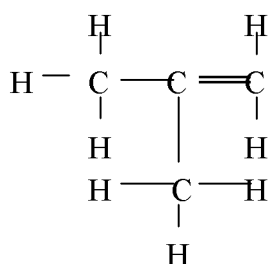
A



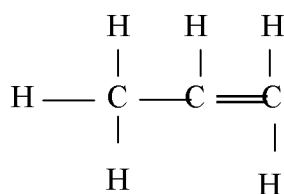
B



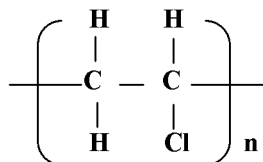
C



D

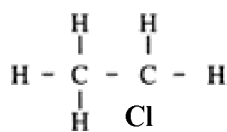


[SBPmidYearF508-39] The diagram shows a structural formula of a polymer.

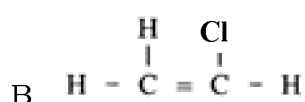


Which of the following is the monomer of the polymer?

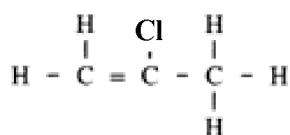
A



B



C



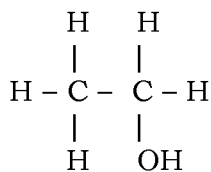
D



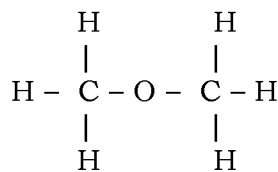
Alcohol

[SPM007-13] Which of the following represents a structural formula of an alcohol?

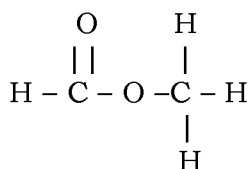
A



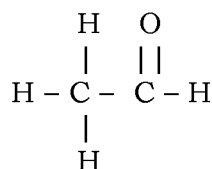
B



C



D



[SPM03-08] Which statement is true of both methanol and ethanol?

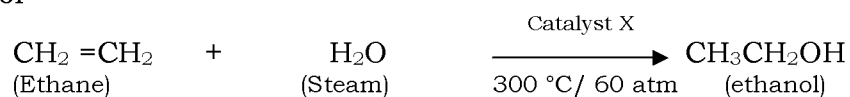
- A They have different functional groups
- B All their physical properties are similar
- C All their chemical properties are different
- D They can be represent by the same general formula

Production of alcohol

[MRSM07-14] What are formed when glucose is fermented?

- A Ethanol and carbon dioxide
- B Ethanol and oxygen
- C Ethene and carbon dioxide
- D Ethene and oxygen

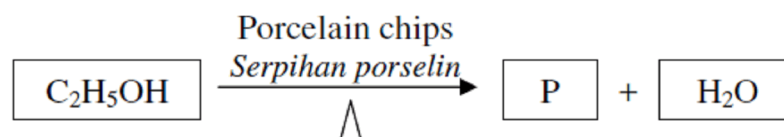
[SPM03-07] The equation below represents the reaction in the industrial preparation of ethanol



What is catalyst X?

- A Platinum
- B Phosphoric Acid
- C Aluminium Oxide
- D Concentrated Hydrochloric Acid

[MRSM10-32] The following equation represents a chemical reaction of ethanol.



What can be used to identify substance P?

- A Bromine water
- B Chlorine water
- C Hydrogen gas
- D Phosphoric acid

[MRSM06–08] The equation below represents the fermentation reaction. What is substance Y?



- A Ethanol
- B Glucose
- C Glycerol
- D Ethanoic acid

[SPM06-14] Diagram 2 shows the set up apparatus for the reaction of yeast with glucose solution.

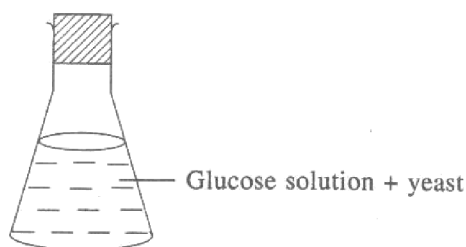


Diagram 2

What is the product obtained in the conical flask after a few days?

- A Ethanol and ethane
- B Ethanoic acid and water
- C Carbon dioxide and water
- D Carbon dioxide and ethanol

Reaction of Alcohol

[SPM06-16] Which of the following substances can undergo a dehydration reaction?

- A Ethanol
- B Methane
- C Methanol
- D Ethanoic acid

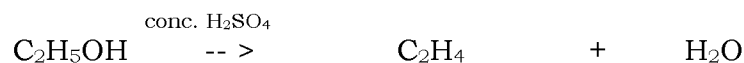
[SBPTrial09-10] The following chemical equation shows a reaction for ethanol.



What is the name of the reaction?

- A Oxidation
- B Reduction
- C Dehydration
- D Fermentation

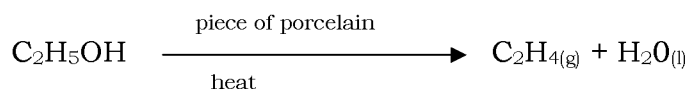
[MRSM04–08] The equation below represents the reaction in the preparation of ethylene.



What is the name of the reaction?

- A Substitution
- B Oxidation
- C Dehydration
- D Addition

[SPM04–12] The following chemical equation shows the conversion of ethanol to ethane



What is the name of the process shown by the above equation?

- A dehydration
- B oxidation
- C reduction
- D fermentation

[MRSM09–31] Diagram 12 shows the apparatus set up used to prepare gas T.

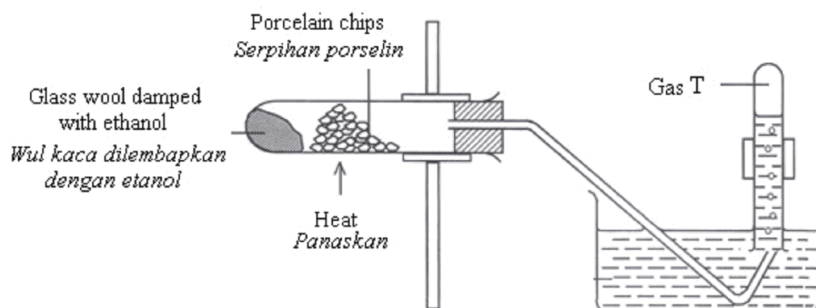
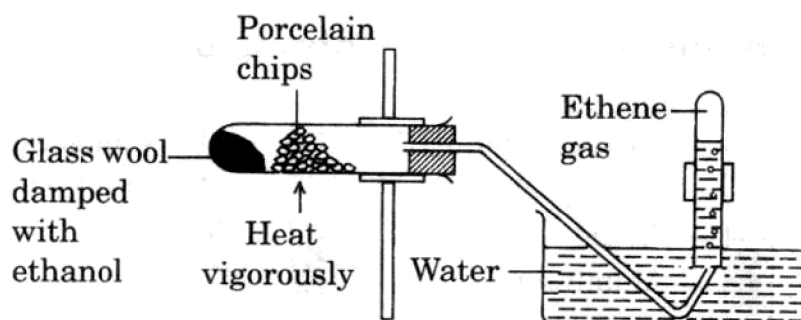


Diagram 12

Which of the following is the characteristic of gas T?

- A Green in colour
- B Decolourised bromine water
- C Changes the blue litmus to red
- D Reacts with alcohol to form ester

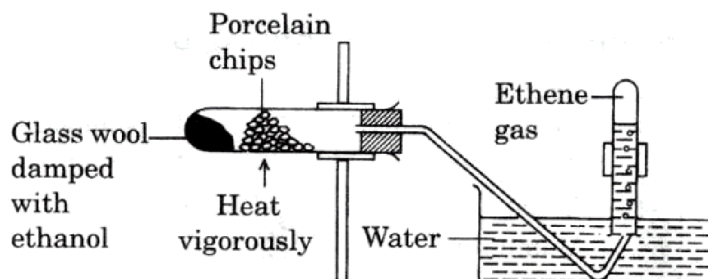
[SPM05–15] The diagram shows the set up of the apparatus for a reaction.



What is the reaction?

- A Esterification
- B cracking
- C dehydration
- D oxidation

[SPM05-18] The diagram shows the setup of the apparatus for the reduction of metal X oxide by hydrogen gas.



What is the metal X oxide?

- A Zinc oxide
- B aluminium oxide
- C magnesium oxide
- D lead oxide

[SBPTrial07-36] When a mixture of 2-butanol, $\text{CH}_3\text{CHOHCH}_2\text{CH}_3$ and concentrated sulphuric acid is heated, gas X is produced. Which of the following is the molecular structure of X?

- A $\text{CH}_3\text{CH}=\text{CHCH}_3$
- B $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)_2$
- C $(\text{CH}_3)_2\text{CHCH}=\text{CH}_2$
- D $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$

[SPM04-11] What are the products formed when ethanol burns completely in excess air?

- A water and carbon dioxide gas
- B water, carbon and carbon dioxide gas
- C water, carbon monoxide and carbon dioxide
- D water, carbon, carbon monoxide gas and carbon dioxide gas

[MRSM07-31] Diagram 13 shows the conversion of molecule A through two different processes.

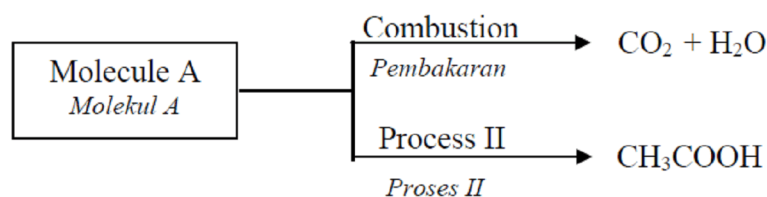


Diagram 13

Which of the following is molecule A and process II

	Molecule A	Process II
A	Ethanol	Esterification
B	Ethanol	Oxidation
C	Ethene	Dehydration
D	Ethanoic acid	Esterification

[MRSM07-31] Diagram 18 shows oxidation process of ethanol.

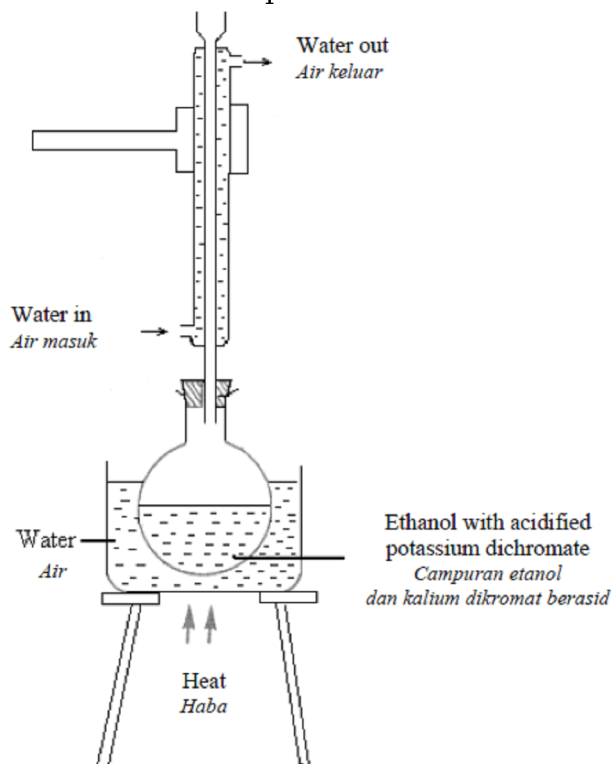


Diagram 18

What can be observed after being heated for 5 minutes?

- A No colour change
- B All of the ethanol vapourises and the flask becomes dry
- C The colour of mixture changes from orange to green
- D The mixture in the flask separated into two layers. The upper layer is yellow while the lower layer is green

Mix of alkane, alkene and alcohol

[MRSM10-31] Both ethane and ethene

- A have the same general formula
- B have similar physical properties
- C can decolourise brown bromine water
- D burn completely in air to produce carbon dioxide gas and water

[SPM10-33] The following equation represents the complete combustion of a hydrocarbon.



What are the values of x and y?

	X	Y
A	1	2
B	2	3
C	3	4
D	4	5

[MRS11-32] Diagram 13 shows the structural formula for two hydrocarbons M and N.



Diagram 13

Which of the following substances can be used to distinguish M and N?

- A Water
- B Sulphuric acid
- C Bromine water
- D Potassium nitrate solution

[MRS03-28]

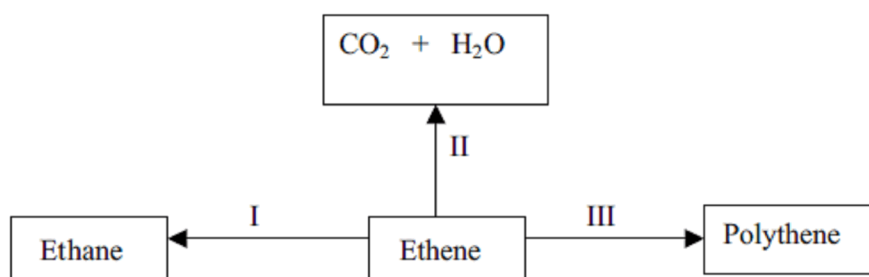


FIGURE 5

Reactions of hydrocarbon are shown in Figure 5. Name the reactions I, II and III.

	I	II	III
A	Reduction	Combustion	Oxidation
B	Addition	Dehydration	Combustion
C	Addition	Combustion	Polymerisation
D	Reduction	Oxidation	Hydration

[MRS07-35] For complete combustion, one molecule of an organic compound needs six molecules of oxygen. What could the formula of this compound be?

- A C_2H_4
- B C_2H_6
- C C_4H_8
- D CH_3OH

[SPM09-42] The following substances can be used as fuel.

- Butane, C_4H_{10}
- Butene, C_4H_8
- Butanol, C_4H_9OH

Why can these substances be used as fuels?

- A The value of the heat of combustion is positive
- B Each molecule has 4 carbon atoms
- C The reaction of combustion in air is an exothermic
- D Do not produce products which affect the environment

[SBPtrial11-24] A carbon compound Q has the characteristics below

- Colourless the brown colour of bromine water
- Colourless the purple colour of acidified potassium manganate(VII)

What is Q?

- A Hexane
- B Hexene
- C Ethanoic acid
- D Ethyl ethanoate

[SBPmidYearF508-21] The diagram shows the cooking gas cylinder.



Which of the following gasses is filled in the gas cylinder?

- A Methane
- B Ethene
- C Propene
- D Butane

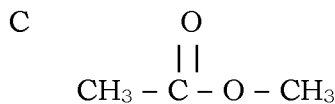
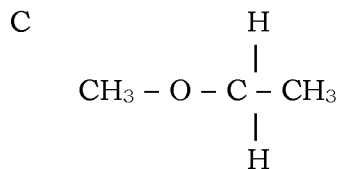
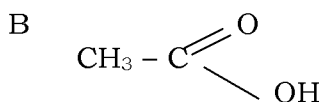
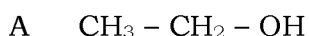
Carboxylic Acid

[SPM05-17] A liquid produced effervescence when reacted with sodium carbonate solution. What is the molecular formula of the liquid?

- A $HCOOH$
- B CH_3CH_2OH
- C CH_3COOCH_3
- D CH_3COONa

Ester

[SPM09-10] Which of the following is the structural formula of ester?



[MRSM03-09] Which of the following reactions will yield an ester?

- A The reaction between carboxylic acid and alcohol
 B The reaction between alkane and carboxylic acid
 C The reaction between alkene and alcohol
 D The reaction between alkane and alkene

[MRSM04-04] The following equation represents a reaction between propanoic acid and ethanol.



Which of the following homologous series does Q belongs to?

- A Ester
 B Alkene
 C Alcohol
 D Carboxylic acid

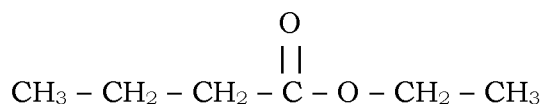
[MRSM06-18] Below is a list of chemicals used by a student to prepare ethyl ethanoate.

- 2 cm³ concentrated sulphuric acid
- 10 cm³ aqueous solution of ethanoic acid 2.0 mol dm⁻³
- 15 cm³ pure ethanol

The mixture was heated under reflux for 30 minutes. At the end of the preparation the student failed to detect the presence of ethyl ethanoate. Which of the following causes the failure?

- A Pure ethanoic acid is not used
 B The amount of sulphuric acid used is not enough
 C 30 cm³ of pure ethanol should have been used
 D Longer duration of heating under reflux is needed

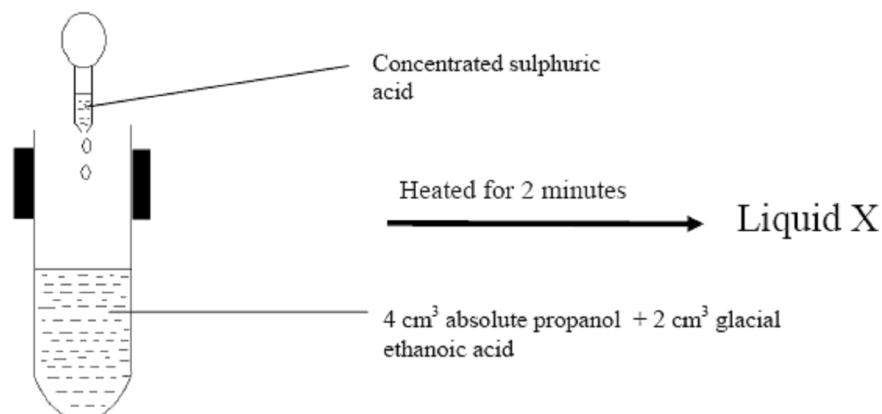
[MRSM06-33] The diagram shows the structural formula for a compound extracted from pineapple.



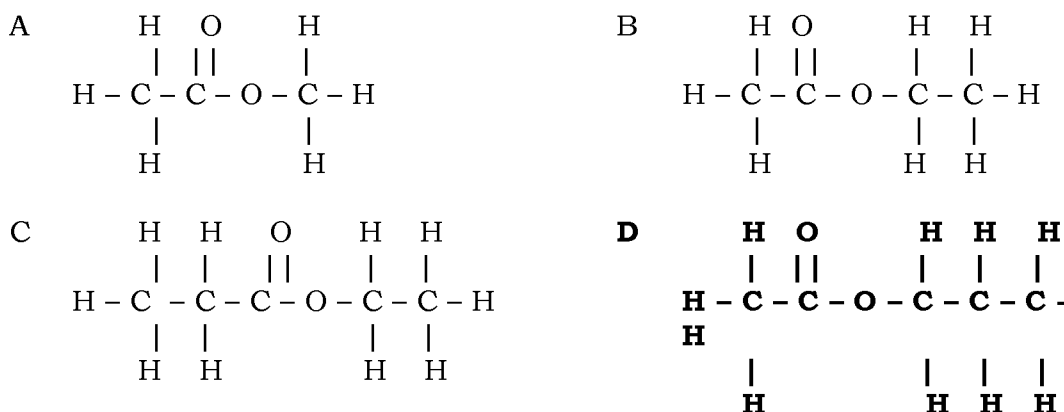
Which of the following are needed to produce the compound synthetically?

	Alcohol	Carboxylic acid
A	n- butanol	Propanoic acid
B	Ethanol	Butanoic acid
C	Ethanol	Propanoic acid
D	n- butanol	Ethanoic acid

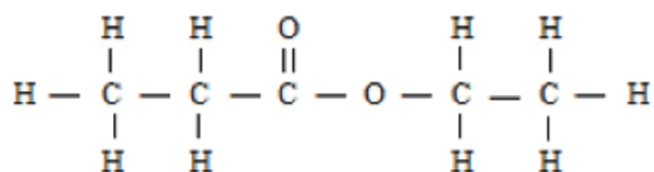
[MRSM05–29] The diagram shows a chemical reaction to form a sweet scented liquid X.



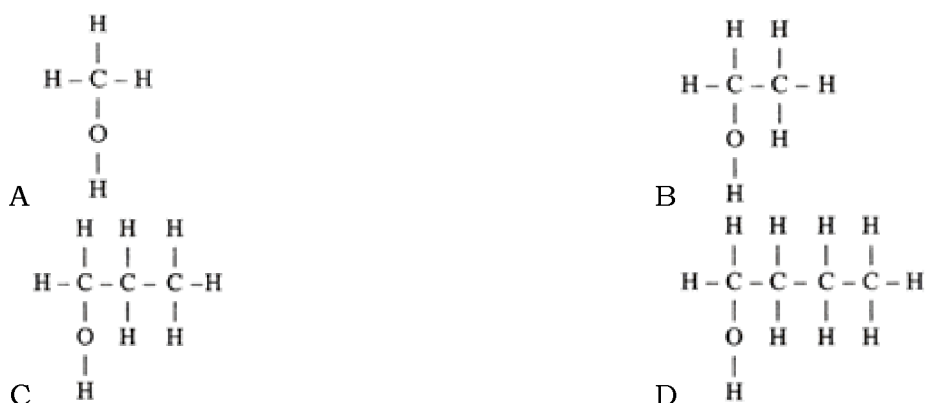
Which of the following structural formulae represents liquid X?



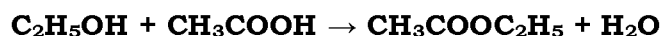
[MRSM07-13] Diagram 4 represents the structural formula of a carbon compound.



Which of the following alcohol reacts with propanoic acid to produce the above compound?



[MRSM07-29] Ethanol reacts with ethanoic acid to form ethyl ethanoate.



What is the formula of the ester formed when methanol reacts with butanoic acid, ($\text{C}_3\text{H}_7\text{COOH}$)?

- A $\text{C}_2\text{H}_5\text{COOC}_2\text{H}_5$
- B $\text{C}_3\text{H}_7\text{COOC}_2\text{H}_5$
- C $\text{C}_3\text{H}_7\text{COOCH}_3$
- D $\text{CH}_3\text{COOC}_3\text{H}_7$

[MRSM09-14] When liquid R is refluxed with propanoic acid and a few drops of concentrated sulphuric acid, a sweet smelling liquid is formed. Liquid R may be

- A propanol
- B ethanoic acid
- C hexane
- D ethyl propanoate

[MRSM11-31] Diagram 12 shows the structural formula of a carbon compound.

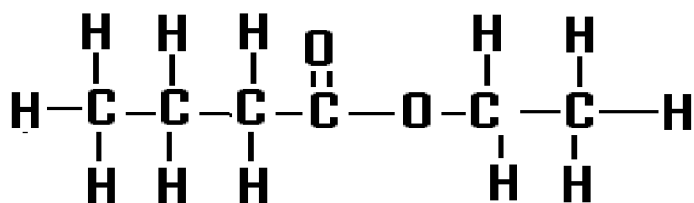
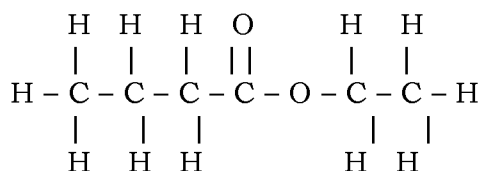


Diagram 12

What is the name of the compound?

- A Ethyl butanoate
- B Butyl ethanoate
- C Propyl butanoate
- D Butyl propanoate

[SPM04-31] The diagram represents the structural formula of a carbon compound.



The compound is produced by the reaction between

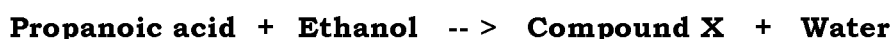
- A ethanol and propanoic acid
- B ethanol and butanoic acid
- C propanol and ethanoic acid
- D butanol and ethanoic acid

[SPM06-45] Which of the following equations can produce fruit flavouring?

- I $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$
 II $\text{C}_2\text{H}_5\text{OH} + \text{C}_2\text{H}_5\text{COOH} \rightarrow \text{C}_2\text{H}_5\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
 III $\text{C}_3\text{H}_7\text{OH} + 2[\text{O}] \rightarrow \text{C}_2\text{H}_5\text{COOH} + \text{H}_2\text{O}$
 IV $\text{C}_8\text{H}_{17}\text{OH} + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COOC}_8\text{H}_{17} + \text{H}_2\text{O}$

- A I and III only
 B II and IV only
 C III and IV only
 D I, II and IV only

[SPM07-44] The following equation shows a chemical reaction.



What is the structural formula of compound X?

- A
$$\begin{array}{ccccccc} & \text{H} & \text{O} & & \text{H} & \text{H} & \text{H} \\ & | & || & & | & | & | \\ \text{H}- & \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & | & & & | & | & | \\ & \text{H} & & & \text{H} & \text{H} & \text{H} \end{array}$$
- B
$$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & & \text{H} & \text{H} \\ & | & | & || & & | & | \\ \text{H}- & \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & | & | & & & | & | \\ & \text{H} & \text{H} & & & \text{H} & \text{H} \end{array}$$
- C
$$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & \text{O} & & \text{H} \\ & | & | & | & || & & | \\ \text{H}- & \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{H} \\ & | & | & | & & & | \\ & \text{H} & \text{H} & \text{H} & & & \text{H} \end{array}$$
- D
$$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & \text{O} & & \text{H} & \text{H} \\ & | & | & | & || & & | & | \\ \text{H}- & \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & | & | & | & & & | & | \\ & \text{H} & \text{H} & \text{H} & & & \text{H} & \text{H} \end{array}$$

[SBPTrial08-49] Diagram 17 shows the process to produce compound J.

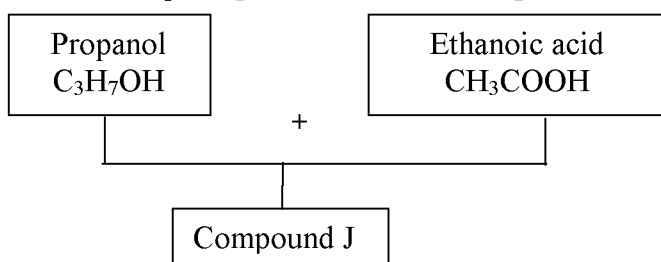


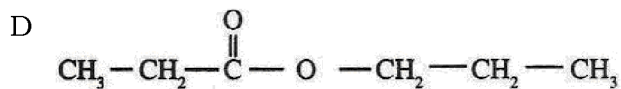
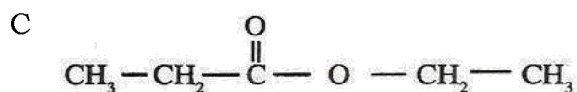
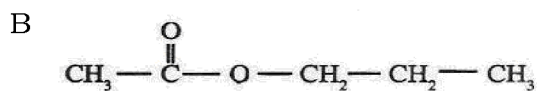
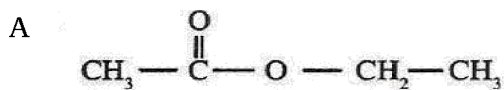
Diagram 17

Which of the following structural formulas is of compound J?

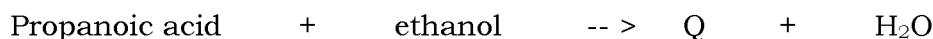
- A
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_3 \end{array}$$
- B
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \end{array}$$
- C
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_3 \end{array}$$
- D
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \end{array}$$

[SBPTrial09-48] Ethanoic acid + propanol → Compound X + Water

What is the structural formula of compound X?



[SBPmidYearF5-42] An Esterification reaction is given as follows:



What is the molecular formula of ester Q?

- A $\text{C}_3\text{H}_7\text{COOC}_2\text{H}_5$
 B $\text{C}_2\text{H}_5\text{COOC}_3\text{H}_7$
 C $\text{C}_2\text{H}_5\text{COOC}_2\text{H}_5$
 D $\text{C}_5\text{H}_{11}\text{COOH}$

[SPM06-31] Diagram 12 shows the structural formula of an ester molecule.

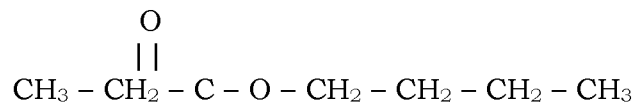


Diagram 12

What is the name of the ester molecule?

- A Butyl ethanoate
 B Propyl ethanoate
 C Propyl butanoate
 D Butyl propanoate

[SPM07-45] Diagram 14 is a molecular formula which represents an organic compound.

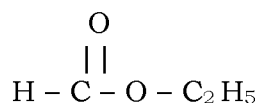


Diagram 14

What is the name of the organic compound?

- A. Ethyl ethanoate
 B. Ethyl methanoate
 C. Methyl ethanoate
 D. Methyl methanoate

Property of ester

[MRSM03-17] Ethanoic acid reacts with ethanol to form compound X. Which of the following are the characteristics of compound X?

- I Insoluble in water
 - II Fruity smell
 - III Molecular formula, CH_3COOH
 - IV Decolourises purple, acidic potassium manganate(VII) solution
- A I and II only
 - B III and IV only
 - C I, II and III only
 - D I, II, III and IV

[SPM04-13] Perfume contains esters. Which of the following is a property of an ester?

- A dissolves in water
- B low boiling point
- C denser than water
- D can conduct electricity

[SPM11-37] Diagram 9 shows a structure formula which represents a food flavouring substance.

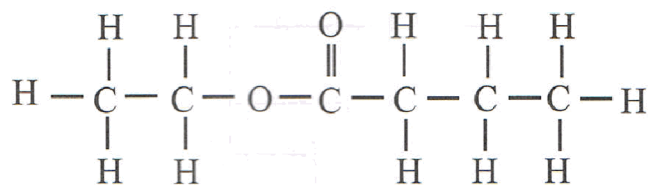


Diagram 9

Which of the following can be used to make the flavouring?

- A Propanol and propanoic acid
- B Butanol and ethanoic acid
- C Etanol and butanoic acid
- D Propyl propanoate and etanol

[MRSM09-13] Which of the following homologous series and its functional group are correctly paired?

	Homologous Series	Functional Group
I	Ester	$ \begin{array}{c} \text{O} \\ \\ - \text{C} - \text{O} - \\ \end{array} $
II	Alkane	$ \begin{array}{c} - \text{C} = \text{C} - \\ \end{array} $
III	Alcohol	$ \begin{array}{c} \\ - \text{C} - \text{OH} \\ \\ \end{array} $
IV	Carboxylic Acid	$ \begin{array}{c} \text{O} \\ \\ - \text{C} - \text{O} - \text{H} \\ \end{array} $

- A I and II
 B II and IV
 C II, III and IV
 D I, III and IV

[SPM03-09] Which of the following pairs of general formulae and homologue series is correct?

	General formula	Homologue series
A	C_nH_{2n}	alkane
B	C_nH_{2n+2}	Alkene
C	$C_nH_{2n+1}OH$	Alcohol
D	$C_nH_{2n+1}COOH$	Ester

[MRSM04-19] Which of the following homologous series and its functional group are correctly paired?

	Homologous Series	Functional group
I	Ester	-COOH
II	Alkene	-C=C-
III	Alcohol	-OH
IV	Carboxylic acid	-COO-C-

A II and III only
 B I and IV only
 C II, III and IV only
 D I, II, III and IV

[SBPTrial07-09] Which of the homologous series is correctly paired to its functional group?

	Homologous series	Functional groups
A	Ester	$\begin{array}{c} \quad \\ -C=C- \end{array}$
B	Alkene	-C-
C	Alcohol	$\begin{array}{c} O \\ \\ -C-O \end{array}$
D	Carboxylic acid	$\begin{array}{c} O \\ \\ -C-O-H \end{array}$

[SBPmidYearF508-48] Which pair of the organic compounds below can be distinguished by using acidified potassium manganate(VII)?

- A C_2H_6 and C_3H_8
 B C_2H_5OH and C_3H_6
 C CH_3CH_2COOH and $CH_3CHCHOH$
 D $CH_3CH_2CH_2CH_3$ and $CH_2CHCH_2CH_2CH_3$

[MRSM03-29]

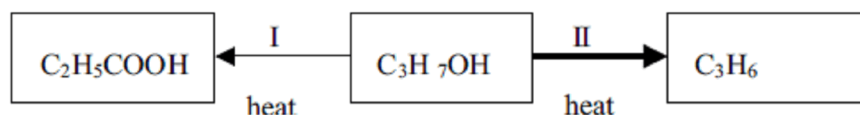
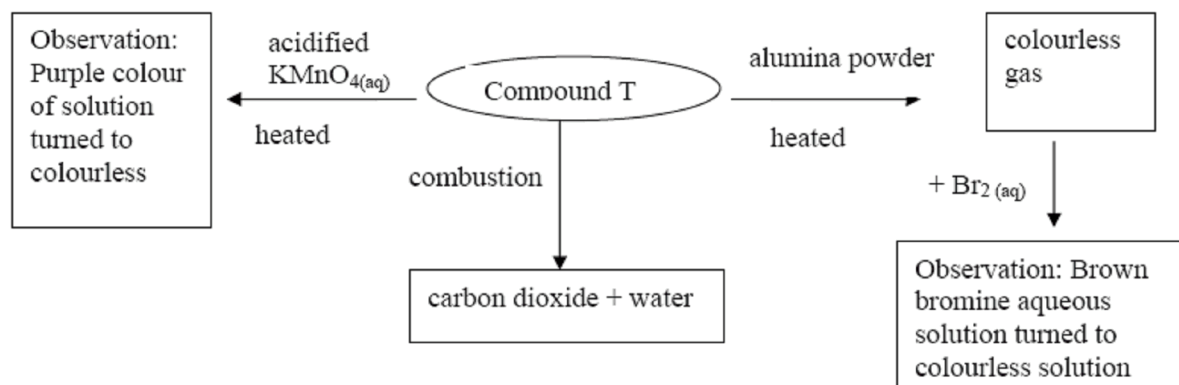


Figure 6

Figure 6 shows the reactions of propanol, C_3H_7OH . Which of the following need to be added to produce reaction I and reaction II?

	I	II
A	Dilute sulphuric acid	Yeast
B	Acidified potassium manganate(VII) solution	Porcelain chips
C	Steam	Acidified potassium dichromate(VI) solution
D	Phosphoric Acid	Dilute sulphuric acid

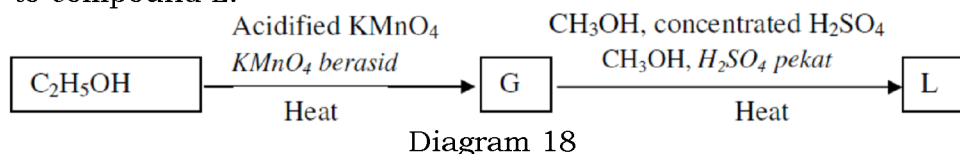
[MRSM05-45] The flow chart shows the chemical properties of a compound T.



Which of the following compounds have similar chemical properties as compound T?

- I Ethanol
 - II Ethene
 - III Propanol
 - IV Ethanoic acid
- A I and II only
 - B I and III only
 - C III and IV only
 - D I, III and IV only

[MRSM09-46] Diagram 18 shows the conversion of ethanol into compound G and subsequently to compound L.



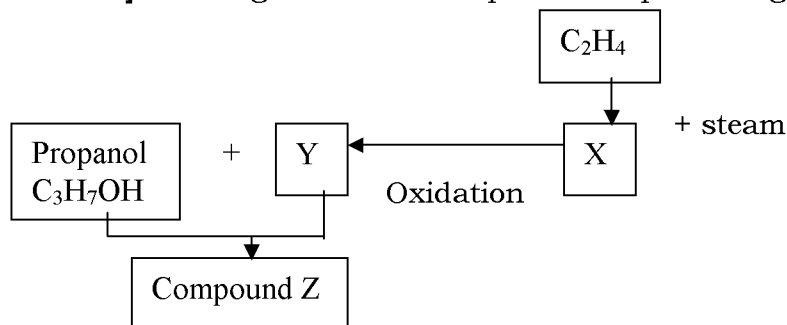
Which of the following may be compound L?

- A Ethanoic acid
- B Ethyl methanoate
- C Ethyl ethanoate
- D Methyl ethanoate

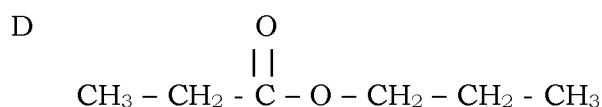
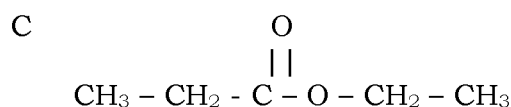
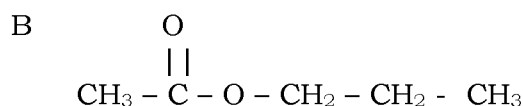
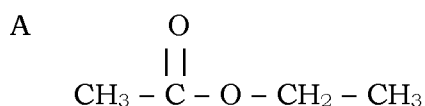
[SBPTrial07-34] Which of the following is the alcohol produced from the alkaline hydrolysis of oil?

- A Ethane-1,2-diol
- B Glycerol
- C Cyclohexanol
- D Butane-2-ol

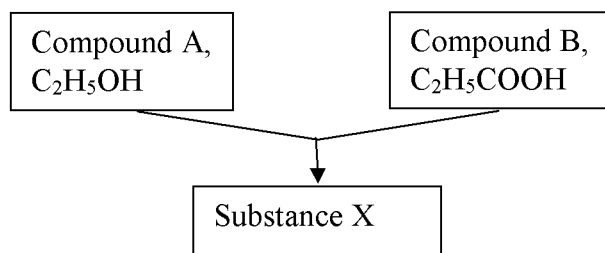
[SPM05-30] The diagram shows the process of producing compound Z.



Which of the following is the structural formula for compound Z?



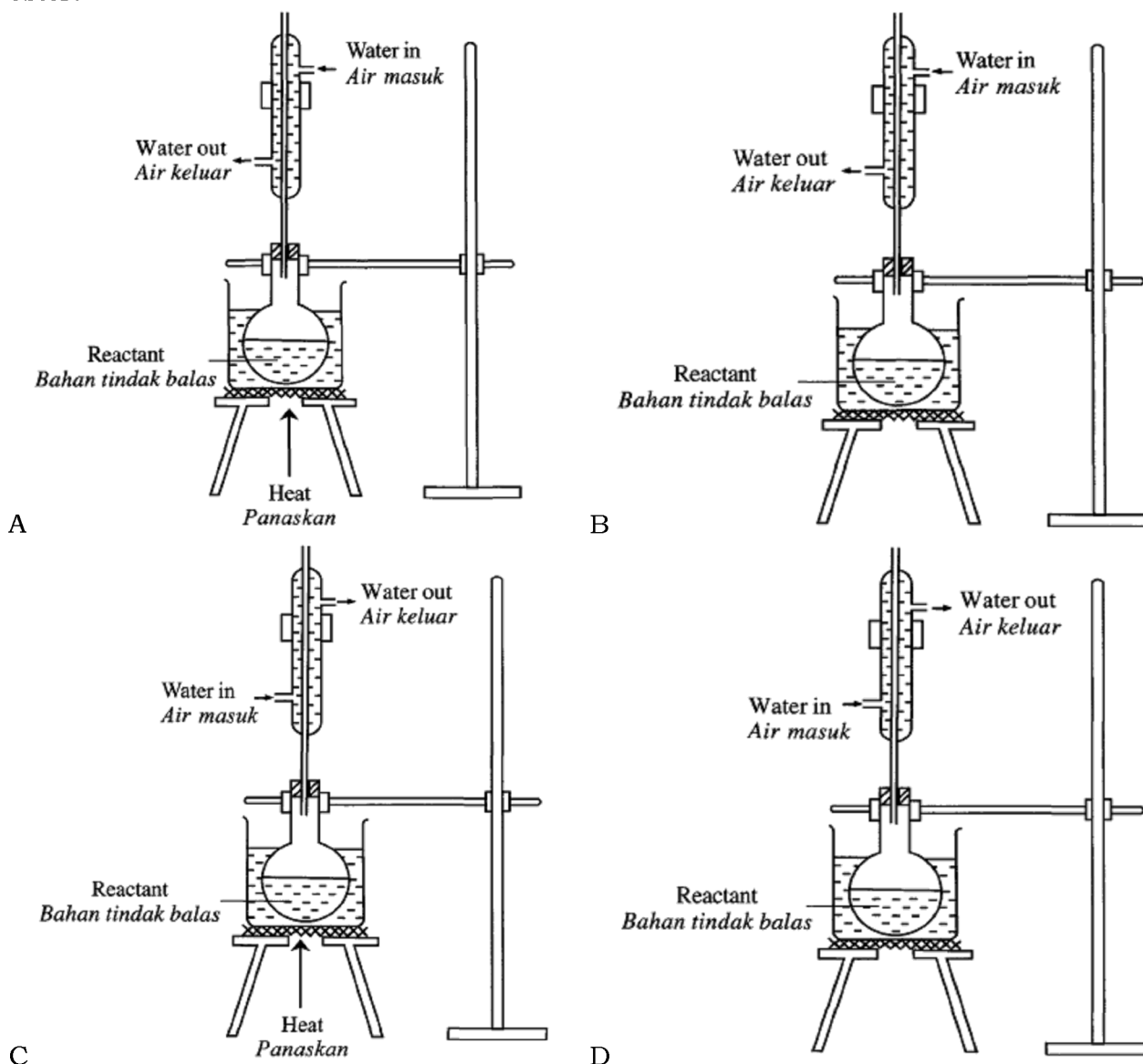
[SBPTrial07-50] The diagram below shows the molecular formulae of two compounds A and B. Substance X is formed when both compounds react with each other.



Which of the following set represents substance X?

	Structural formula	Name
A	$\begin{array}{ccccccc} & \text{H} & \text{O} & & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & & & \text{H} & \text{H} & \text{H} \end{array}$	Ethyl propanoate
B	$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & & \text{H} & \text{H} \end{array}$	Ethyl propanoate
C	$\begin{array}{ccccccc} & \text{H} & \text{O} & & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & & & \text{H} & \text{H} & \text{H} \end{array}$	Propyl propanoate
D	$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & & \text{H} & \text{H} \end{array}$	Propyl propanoate

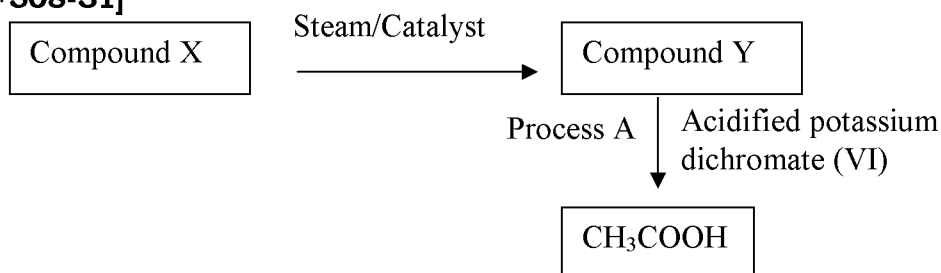
[SPM09-21] Which of the following is the correct apparatus set-up for the preparation of an ester?



[SBPmidYearF5-18] Which of the following is not grouped in the same homologous series ?

- A Propane, butane, hexane
- B Ethanol, methyl propanol, 1-butanol
- C Acetic acid, propanoic acid, sulphuric acid
- D Heptene, ethene, pentene

[SBPmidYearF508-31]



What could be the organic compounds X and Y, Catalyst and Process A in the diagram?

	Compound X	Compound Y	Catalyst	Process A
A	Ethene	Ethanol	Phosphoric acid	Oxidation
B	Ethane	Ethene	Nickel	Hydrogenation
C	Ethane	Ethene	Nickel	Oxidation
D	Ethene	Ethanol	Phosphoric acid	Hydrogenation

Mix

[SBPTrial11-10] Which of the following pairs of homologous series and general formula is correct?

	Homologous	General formula
A	Alkane	C_nH_{n+2}
B	Alkene	C_nH_{2n+1}
C	Alcohol	$C_nH_{2n+1}OH$
D	Carboxylic acid	$C_nH_{n+1}COOH$

[SPM11-14] What is the correct functional group for the following homologous series?

	Homologous series	Functional group
A	Ester	$\begin{array}{c} O \\ \\ - C - O - \end{array}$
B	Alkane	$\begin{array}{c} \quad \\ - C = C - \end{array}$
C	Alcohol	$\begin{array}{c} O \\ \\ - C - OH \end{array}$
D	Carboxylic acid	- OH

[SPM10-18] Compound X has the following properties.

- Insoluble in water
- Has a boiling point of $-89\text{ }^{\circ}C$

What is compound X?

- A Ethane
- B Ethanol
- C Ethanoic acid
- D Ethyl ethanoate

[MRSM10-15] Diagram 2 shows the mixture of liquid Z and water in a test tube.

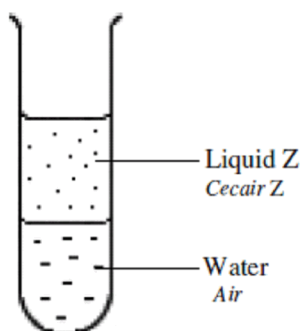


Diagram 2

Which of the following is liquid Z?

- A Glucose
- B Ethanol
- C Ethanoic acid
- D Ethyl ethanoate

[SPM10-36] Which structural formula does not correspond to the named compound?

	Compound name	Structural formula
A	Ethanoic acid	$ \begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & \text{H} & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & \text{H} & \text{H} & \end{array} $
B	Ethanol	$ \begin{array}{ccccccc} & \text{H} & \text{H} & & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{O} & - \text{H} & & \\ & & & & & & \\ & \text{H} & \text{H} & & & & \end{array} $
C	Ethene	$ \begin{array}{ccccccc} & \text{H} & \text{H} & & & & \\ & & & & & & \\ \text{H} & - \text{C} & = \text{C} & - \text{H} & & & \end{array} $
D	Ethane	$ \begin{array}{ccccccc} & \text{H} & \text{H} & & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{H} & & & \\ & & & & & & \\ & \text{H} & \text{H} & & & & \end{array} $

Fat

[SBPtrial10-28] Which of the following is **incorrect** about the conversion of unsaturated fats to saturated fats?

- A The boiling point of the oil increases
- B Physical state changes from liquid to solid
- C Relative molecular mass of the oil molecule increases
- D Intermolecular forces become weaker *D*

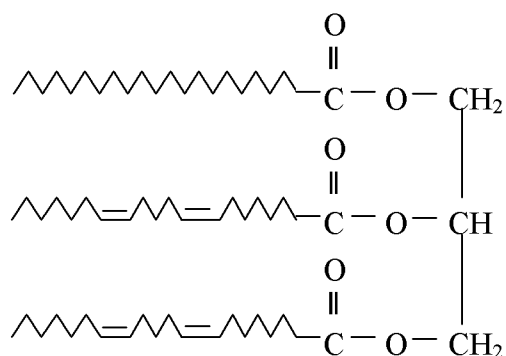
[MRSM07-14] Unsaturated fats can be converted to saturated fats through

- A hydrogenation
- B esterification
- C neutralization
- D fermentation

[SPM08-18] What is the structural formula of a monounsaturated fatty acid?

- A $\text{CH}_3 - (\text{CH}_2)_7 - \text{CH} = \text{CH} (\text{CH}_2)_7 - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$
- B $\text{CH}_3 - (\text{CH}_2)_{14} - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$
- C $\text{CH}_3 - (\text{CH}_2)_{14} - \overset{\text{CH}_3}{\mid} \text{CH} - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$
- D $\text{CH}_3 - (\text{CH}_2)_4 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - (\text{CH}_2)_7 - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$

[SBPmidYearF5-50] The figure below shows the structural formula of a molecule of fat X.



Which of the following is true about fat X?

- I Fat X can undergo hydrogenation reaction.
 II Fat X could be found much in plants or vegetables.
 III Increases the amount of cholesterol in blood.
 IV Fat X is an ester.
- A I and II
 B III and IV
 C I, II and IV
 D I, II, III and IV

Rubber

[SPM10-48] Which substance is a natural polymer?

- A Polythene
 B Polypropene
 C Polyisoprene
 D Polyvinyl chloride

[MRSM10-14] What should be added to latex so that it stays in liquid form?

- A Ethanol
- B Ethanoic acid
- C Ammonia solution
- D Hydrochloric acid

[SPM11-42] A rubber tapper finds that latex coagulates after several hours. What substance should be added into the latex to prevent it from coagulating?

- A Sodium chloride solution
- B Ammonia solution
- C Ethanoic acid
- D Nitric acid

[SBPmidYearF5-17] Which of the chemical substance can prevent the coagulation of latex?

- A Aqueous ammonia solution.
- B Aqueous ethanoic acid solution
- C Aqueous sodium chloride solution
- D Vinegar

[SPM06-46] A rubber tapper faces a problem of coagulated latex. To solve the problem, he has to add a substance into the latex.

Choose the correct substance and explanation to solve the problem.

	Substance	Explanation
A	Ammonium solution	Contains OH^- ion that neutralizes the H^+ ion from the lactic acid
B	Ethanoic acid	Contains H^+ ion that neutralizes the negative charge on the membrane of the rubber particle
C	Sodium chloride solution	As a preservative to maintain the original state of the latex
D	Water	To make the latex more dilute

[SPM10-35] What happens when natural rubber is vulcanized?

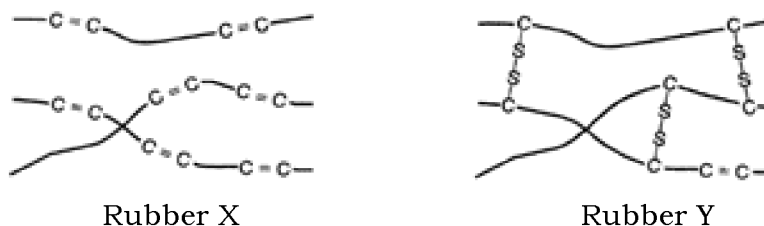
- A The melting point of rubber decreases
- B The vulcanised rubber is less resistant to heat
- C Rubber molecules slide more easily over each other
- D Sulphur atoms form cross-links between rubber molecules

[SPM08-03] Which of the following statements are true about vulcanized rubber?

- I Easily oxidized
- II Not heat resistant
- III Stronger than unvulcanized
- IV More elastic than unvulcanized rubber

- A I and II
- B I and III
- C II and IV
- D III and IV

[MRSM07-29] Diagram 11 shows the structure for two types of rubber.



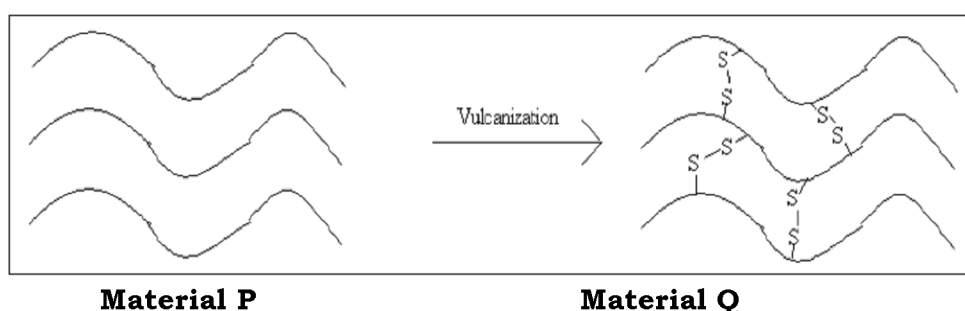
Rubber X

Rubber Y

Based on Diagram 11, which of the following statements is true?

- A Rubber X is more elastic than rubber Y.
- B Rubber X is harder than rubber Y.
- C Rubber X is easily oxidised than rubber Y.
- D Rubber X has higher melting point than rubber Y.

[MRSM05-31] The diagram shows the structural change caused by the vulcanization of material P.



Material P

Material Q

Which of the following statements are true about the diagram?

- I Q is harder than P
 - II Q is easily oxidized compared to P
 - III Q is more elastic than P
 - IV Q is more heat resistible than P
- A I and III only
 - B II and IV only
 - C I, III and IV only
 - D I, II, III and IV

[SPM09-50] The rubber gloves used by doctors during surgery are made from vulcanized rubber. What property of vulcanized rubber makes it suitable to be used for making these gloves?

- A Harder than unvulcanised rubber
- B Stronger than unvulcanised rubber
- C Heat resistant
- D oxidation-resistant

[SBPtrial10-48] The aircraft tyres are made from vulcanized rubber. What property of vulcanized rubber makes it suitable to be used for making these aircraft tyres?

- A It can take the tremendous stress and strength
- B It is harder and stronger
- C It resist to the oxidation
- D It can maintain their elasticity

Structure {Paper02}

[SBPtrial07-05]

Diagram 5 shows the structural formulae of compounds J and K.



DIAGRAM 5

(a) State the homologous series for compounds J and K. [2M]

Compound J:

Compound K:

(b) Compound K can be produced from compound J under a high temperature and pressure in the presence of a catalyst.

(i) Name compound K. [1M]

.....

(ii) Name the reaction. [1M]

.....

(c) Compound L is produced when an acidic potassium dichromate (VI) solution is added into a test tube containing compound K.

(i) State one observation for this reaction. [1M]

.....

(ii) Write the molecular formula of compound L. [1M]

.....

(d) Compound J burns completely in excess oxygen.

(i) Write the chemical equation for the complete combustion of J. [1M]

.....

(ii) 5.6 g of compound J undergoes complete combustion at room conditions. Calculate the volume of carbon dioxide gas released. [3M]

[1 mol of gas occupies 24 dm³ at room conditions; Relative atomic mass: H=1, C=12]

[SBPmidyearF508-06]

Figure 6 shows the conversions of organic compound A to another substances, C₂H₄(OH)₂ and C₂H₅OH through Processes A and C.

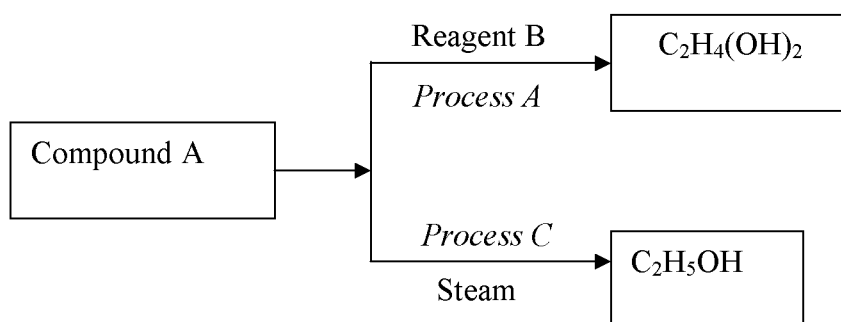


Diagram 6

(a) What is meant by organic compound? [1M]

.....

(b) (i) Write the molecular formula of compound A. [1M]

.....

(ii) Name the compound A. [1M]

.....

(iii) Identify a functional group of compound A. [1M]

.....

(c) Compound A reacts with Reagent B to produce substance $C_2H_4(OH)_2$ through Process A.

(i) Suggest Reagent B. [1M]

.....

(ii) Name Process A. [1M]

.....

(iii) State the observation when the reaction occurs. [1M]

.....

(d) Substance C_2H_5OH is produced when the compound A reacts with steam through Process C.

(i) Write the equation to show the reaction. [1M]

.....

(ii) State the homologous series represented by C_2H_5OH . [1M]

.....

(iii) State one condition that must be used to carry out Process C. [1M]

.....

[MRSM06-06]

Diagram 6 shows the flow chart for the conversion of propene to polypropene, propane and propanol.

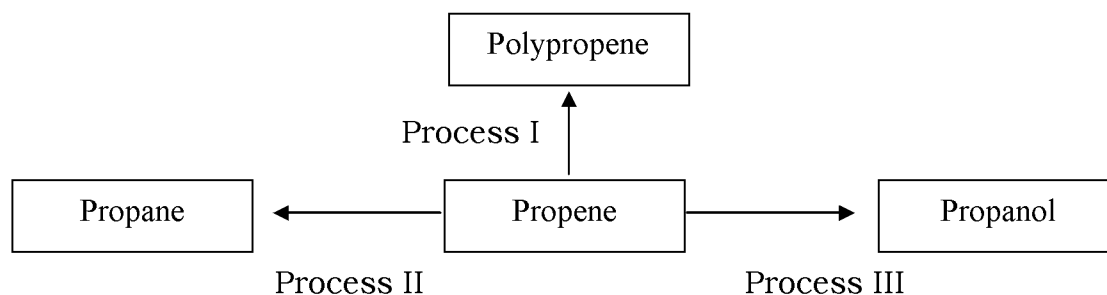
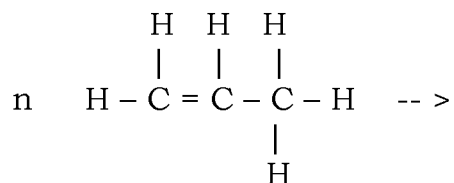


Diagram 6

(a) Name the homologous series for propene. [1M]

.....

(b) Complete the chemical equation for Process I by drawing the structural formula of polypropene. [1M]



(c) Write the chemical equation for process II. [1M]

.....

(d) Propene and propane are combustible in oxygen.

(i) Write the chemical equation for either one of the reactions in excess oxygen. [1M]

.....

(ii) Compare the sootiness for the combustion of propene and propane. Explain your answer. [Given the relative molecular mass of propene = 42 and propane = 44][3M]

.....

.....

(e)(i) Explain how process III can be carried out. [3M]

.....

.....

.....

.....

(ii) Write the chemical equation for process III. [1M]

.....

[MRSM04-06]

Diagram 4 shows the structural formulae of compounds J and K.

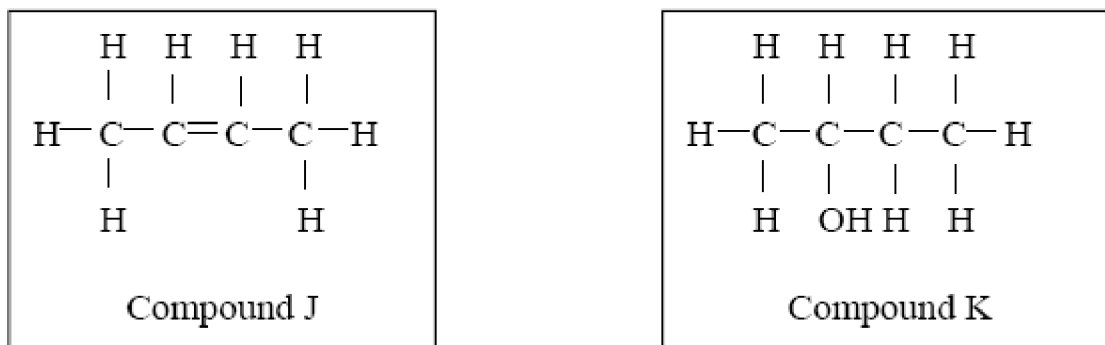


Diagram 4

(a) State the homologous series for compounds J and K. [1M]

Compound J :

Compound K :

(b)(i) Name compound K. [1M]

.....

(ii) Write the molecular formula for a compound that has 7 carbon atoms and in the same homologous series as K. [1M]

.....

(c) Draw the structural formulae for another **two** isomers of compound J. [2M]

(d) Compound J combines with each other at high temperature and pressure in the presence of a catalyst to form a new substance.

(i) Name the process for the formation of this new substance. [1M]

.....

(ii) Draw the structural formula of this new substance. [1M]

(e) Compound K is added into a test tube containing acidic potassium permanganate solution and heated for a few minutes.

(i) State **one** observation for this experiment. [1M]

.....

(ii) Write an equation for this reaction. [1M]

.....

(f) Both of compounds J and K are combustible in air.

Explain the difference in the quantity of soot produced by the two compounds during combustion. [3M]

[Relative Atomic Mass: H, 1; C, 12; O, 16]

.....

.....

[MRSM03-04]

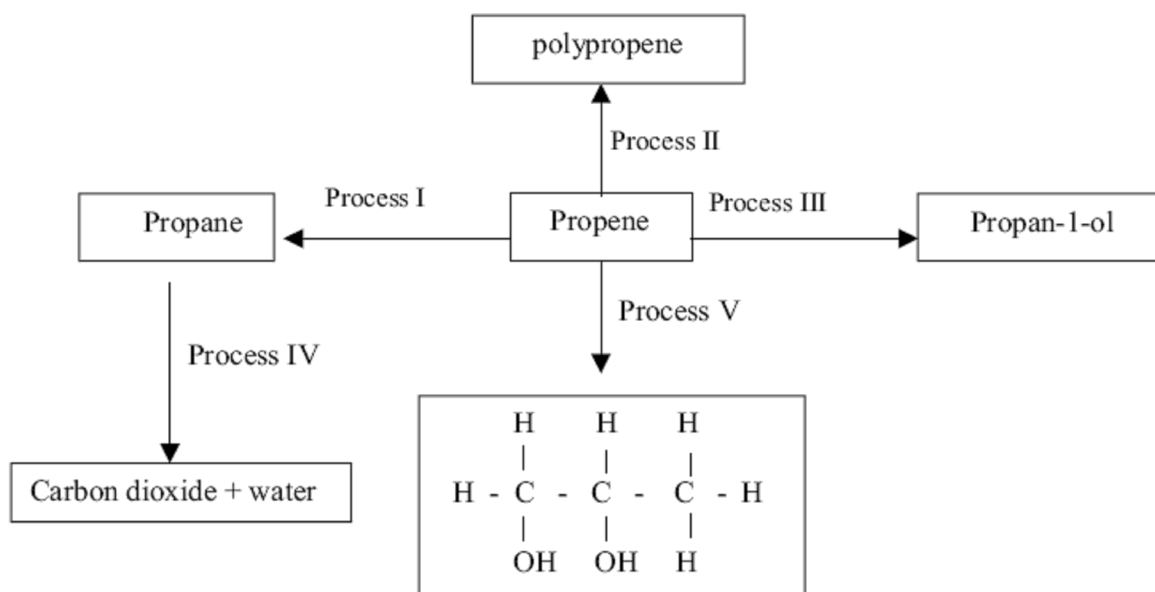


FIGURE 4

Propane is an important hydrocarbon in petrochemical industries. Figure 4 shows the chemical reactions of propane. Based on figure 4, answer the following questions.

(a) Draw the structural formula of propene. [1M]

(b) Name process I. [1M]

.....

(c) Under certain conditions, propene reacts to form polypropene. Write a balanced equation for the formation of polypropene in Process II. [1M]

.....

(d) Explain briefly how Process III is carried out in industries. [2M]

.....

.....

.....

(e) Name a reagent that can be used to carry out Process V. [1M]

.....

(f) Combustion of propane is represented by Process IV.

(i) Write a chemical equation for the combustion of propane in excess oxygen. [1M]

.....

(ii) If 2.0 dm³ propane gas undergoes complete combustion at room condition, calculate the mass of water formed. [3M]

[1 mole of gas occupies 24 dm³ at room conditions, Molar mass of water = 18 g mol⁻¹]

[SPM09-04]

Table 4 shows the molecular formulae and boiling points for three compounds, which are members of a homologous series.

Compound	Molecular formula	Boiling Point (°C)
P	C ₂ H ₄	-103
Q	C ₃ H ₆	-48
R	C ₄ H ₈	-6

Table 4

(a)(i) Name the homologous series for these compounds. [1M]

.....

(ii) Write the general formula for this homologous series. [1M]

.....

(b) Explain why the boiling for the members of this homologous series increases when the number of carbon atoms per molecule increases. [3M]

.....

.....

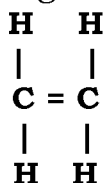
.....

.....

(c) Write the chemical equation when compound P react with the steam in the presence of phosphoric acid at the temperature of 300 °C and 60 atm pressure.[1M]

.....

(d) Compound P undergoes polymerisation.
The structural formula for compound P is given below.



Write the equation for the polymerisation of compound P. [2M]

.....

(e) Draw the structural formula for Q.

[SPM08-04]

The following information is about the compound C_2H_5OH .

- Miscible in all proportions with water
- Undergoes combustion
- A member of a homologous

(a) What is the name of this compound? [1M]

.....

(b) What is the general formula for the homologous series of this compound ? [1M]

.....

(c) One mole of this compound undergoes complete combustion to form gas X and water as shown below.



(i) State the name of gas X. [1M]

.....

(ii) What are the value of m and n ? [2M]

$$m = \dots\dots\dots \quad n = \dots\dots\dots$$

(d) Compound C_2H_5OH reacts with ethanoic acid to produce compound Y which has a sweat smell.

(i) State the name of compound Y. [1M]

.....

(ii) Draw the structural formula of compound Y. [1M]

(e) Compound C_2H_5OH undergoes dehydration to produce ethane.

(i) Suggest one dehydrating agent for this reaction. [1M]

.....

(ii) Draw an apparatus set-up for this dehydration reaction to collect ethane. [2M]

[SPM04-06]

Diagram 6 shows the reaction used in industrial production of margarine.

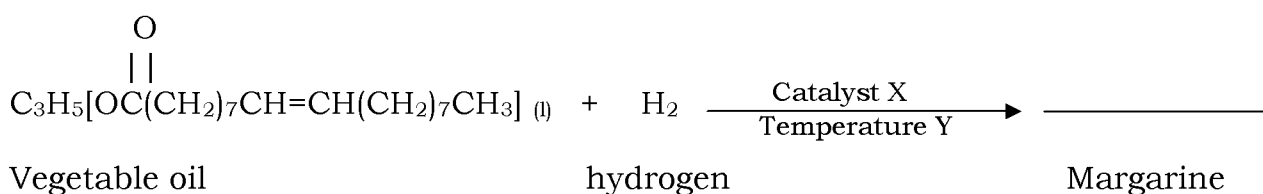


Diagram 6

(a)(i) Name the process used to produce margarine in Diagram 6. [1M]

.....

(ii) State one effect of this process on the vegetable oil. [1M]

.....

(b) (i) Name catalyst X and state the range of temperature Y in the production of margarine. [2M]

Catalyst X :

Temperature Y :

(ii) Based on the collision theory, explain the effect of catalyst X and temperature Y in the production of margarine. [3M]

.....

.....

.....

.....

(iii) Write the chemical formula for margarine in Diagram 6. [1 M]

.....

(c) Name one example of a vegetable oil used in the production of margarine. [1M]

.....

[SBPtrial08-05]

Table 5 shows molecular formulae of 4 carbon compounds.

Compound	Molecular Formula
A	C_4H_8
B	C_4H_{10}
C	C_4H_9OH
D	C_2H_5COOH

Table 5

(a) Write the general formula of the homologous series of compound B. [1M]

.....

(b) State the functional group of compound A and compound D [2M]

Compound A :

Compound D :

(c) Compound B shows isomerism. Draw the structural formula of **all** isomers of compound B. [2M]

(d) Compound D and compound C are reacted with the presence of the concentrated sulphuric acid.

(i) Name the product formed from the reaction. [1M]

.....

(ii) State one special characteristic of the product formed. [1M]

.....

(e) Compound A burns in excess oxygen to produce carbon dioxide and water.

(i) Write a balanced chemical equation for the reaction. [1M]

.....

(ii) 11.2 g of compound a burns in excess oxygen, calculate number of carbon dioxide molecules formed. [2M]

[Relative atomic mass: C=12, O=16 and Avogadro number = 6.03×10^{23}]

[MRSM10-06]

Diagram 6 shows the structural formula of two organic compounds K and L.

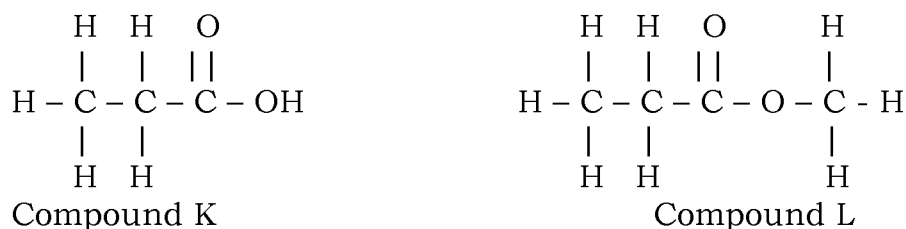


Diagram 6

Compound K and L belong to two different homologous series.

(a) Write the general formula for the homologous series of compound K. [1M]

.....

(b) Name compound L. [1M]

.....

(c) Compare two physical properties of compounds K and L by completing the following table: [2M]

Physical property	Compound K	Compound L
Odour		
Solubility		

(d) Compound L can be produced from K in the laboratory.

(i) Describe briefly how this process can be carried out. [3M]

.....

.....

.....

.....

.....

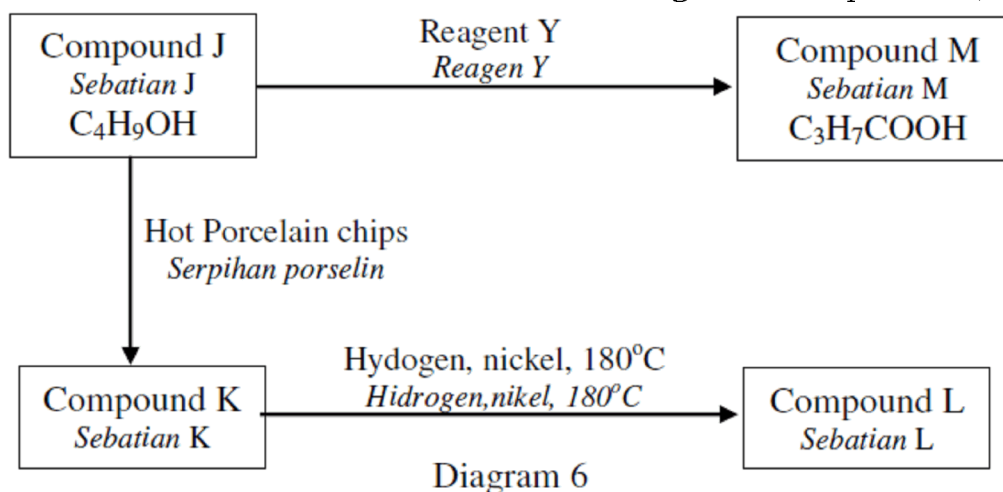
(ii) Write the equation for the reaction. [2M]

.....

(iii) Compound K is produced from the oxidation of propanol. Draw all possible isomers for propanol. [2M]

[MRSM11-06]

Diagram 6 shows a series of chemical reaction starting from compound J, C₄H₉OH.



(a) (i) Name the homologous series of compound J. [1M]

.....

(ii) Compound J has four isomers. Draw the structural formula of **one** isomer of J. [1M]

(b) Draw an apparatus set-up that can be used in the laboratory to carry out the conversion of compound J to compound K. [2M]

(c) The empirical formula of compound L is C_2H_5 . Determine its molecular formula given that the relative molecular mass is 58. [3M]

[Relative atomic mass: C=12; H=1]

(d) Compound K is an unsaturated hydrocarbon while compound L is a saturated hydrocarbon. Describe a chemical test to differentiate compound K and L. [3M]

.....

.....

.....

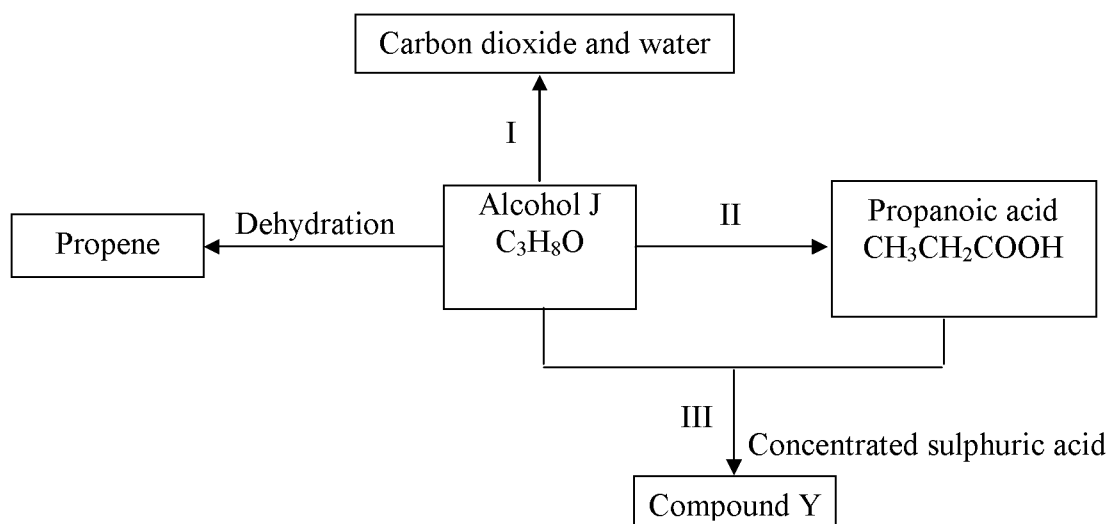
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(e) Name the reagent Y which is used to convert compound J, C_4H_9OH to compound M, C_3H_7COOH .

.....

[SBPtrial09-05]

Diagram 5 shows a series of changes on alcohol J with a molecular formula C_3H_8O .



(a) Write the chemical equation for the reaction in process I. [1M]

.....

(b) Alcohol J can be converted into propanoic acid through process II.

(i) State the name of process II. [1M]

.....

(ii) Describe briefly the method to prepare propanoic acid from alcohol J. [2M]

.....

.....

.....

(iii) Draw the structural formula for all the isomers of alcohol J. [2M]

(c) Compound Y is produced from the reaction between alcohol J and propanoic acid through process III.

(i) State the name of compound Y. [1M]

.....

(ii) State a special characteristic for compound Y. [1M]

.....

(d) Propene can be converted to propane by the hydrogenation process.
Describe briefly one chemical test to differentiate between propene and propane. [2M]

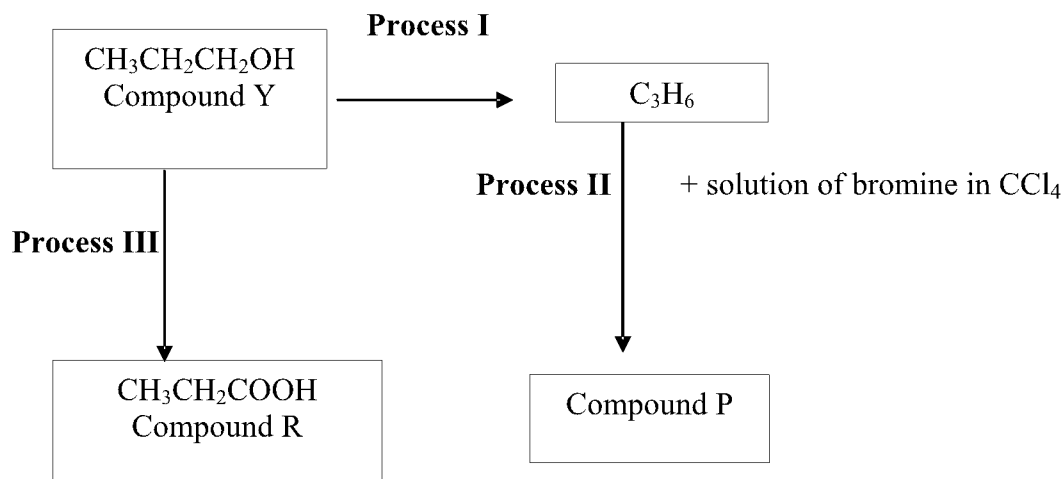
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.....

[MRSM07-05]

Diagram 5 shows a series of chemical reactions starting from compound Y.



(a) Name compound Y. [1M]

.....

(b) Draw a diagram to show the set-up of apparatus if Process I is to be carried out in a laboratory. [2M]

Name of compound P :

(d) Describe how Process III could be done in a laboratory. [3M]

.....

.....

.....

(e) (i) Name the process that occurred. [1M]

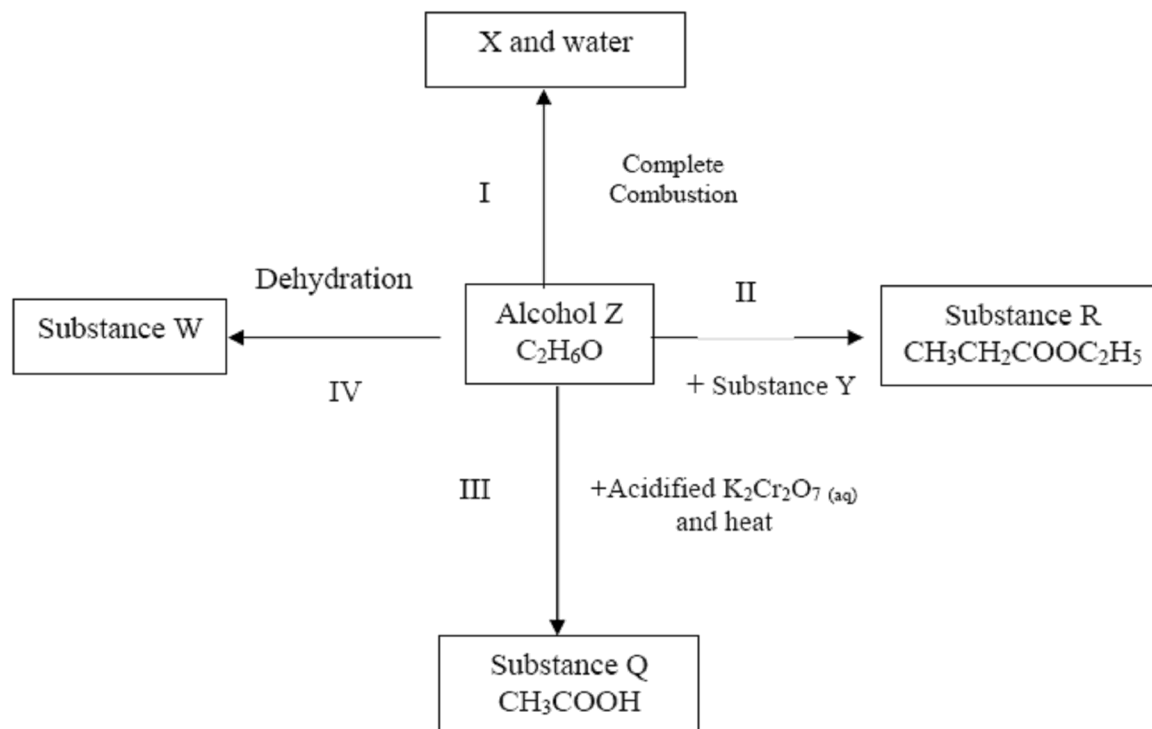
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(ii) Write a chemical equation for the above reaction. [2M]

.....

[MRSM05-05]

Diagram 5 shows the flow chart of a series of conversions related to alcohol Z



Based on Diagram 5, answer the following questions:

(a) Name substance X? [1M]

.....

(b) Describe briefly the method of preparing substance R from alcohol Z in the laboratory. [3M]

.....

.....

.....

(c) (i) What is observed in conversion III ? [1M]

.....

(ii) Write a chemical equation for the reaction in conversion III. [1M]

.....

(d) (i) Draw the structural formula of substance W and name it. [2M]

(ii) Draw the set-up of apparatus that can be used to obtain substance W from alcohol Z. [2M]

[SPM03-04]

Diagram 4 shows the setup of apparatus for the preparation of ethyl ethanoate from the reaction of ethanol with ethanoic acid.

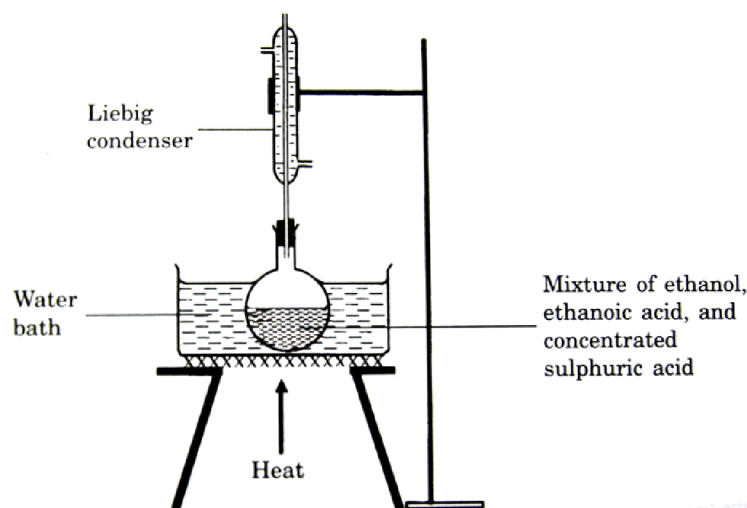


Figure 4

(a) On the Liebig condenser in Diagram 4, marks 'X' to indicate the place where water flows in and 'Y' where water flows out. [1M]

(b) Why is mixture heated using a water bath? [2M]

.....

.....

.....

(c) (i) Name the reaction for the preparation of ethyl ethanoate. [1M]

.....

(ii) Write the chemical equation for the reaction in (c) (i). [1M]

.....

(d) The experiment is repeated by replacing ethanol with propanol.

(i) Name the ester formed. [1M]

.....

(ii) State **one** physical property of the ester. [1M]

.....

(e) The flow chart below shows the conversion of ethanol to ethane and ethanol to ethanoic acid.



Based on the flow chart, write the chemical equation for

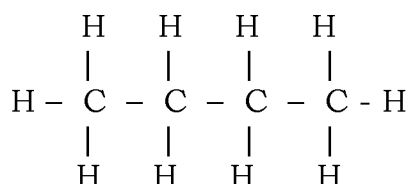
(i) process I [1M]

.....

(ii) process II [1M]

.....

(f) An alkane has a structural formula as shown below



What is the name of the alkane? [1M]

.....

[SBPtrial05-06] {Translate}

Table 2 shows the type of polymers and monomers for the polymerisation process.

Monomer	Polymer
Amino acid	
	Starch
Ethene	
Chloroethene	Polychloroethane (PVC)
	Natural rubber

(a) What mean by the polymerisation? [1M]

.....

(b) Complete the table 2 below. [4M]

(c) Draw the structural formula of polymer was produce by monomer-monomer of ethene. [1M]

(d) Diagram 4 shows the structural formula for polychloroetene

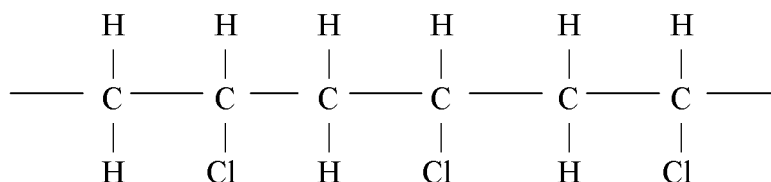


Diagram 4

(i) Draw the structural formula of monomer for Polychloroethene. [1M]

(ii) In the water supply system, PVC pipe the most used for the replacement of metal pipe. State one advantage PVC than metal pipe from chemical property. [1M]

.....

(e) Name

(i) the substance that can coagulate the latex. [1M]

.....

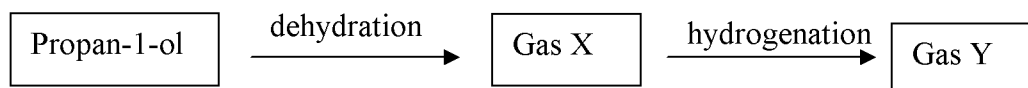
(ii) the substance that can prevent the coagulation of the latex. [1M]

.....

Essay {Paper02}

[SBPmidyearF507-09]

- (a) (i) What is the functional group of alkenes?
- (ii) Write the molecular formula and the name for the fourth member of alkenes.
- (iii) Based on your answer in (a) (ii), draw the structural formulae of **three** possible isomers. [6M]
- (b) The flow chart below shows the chemical conversion of propan-1-ol to gas X and then gas X to gas Y.



- (i) With the help of suitable diagrams, describe a laboratory experiment to prepare gas X from the dehydration reaction of propan-1-ol.

In your answer, include the chemical equation and explanation on how to ensure that gas X is already produced. [10M]

- (ii) Name gas Y.

Gas X burns with a more sooty flame than gas Y. Explain why. [4M]

[Relative atomic mass: C=12, H=1]

-----oooOO aĐaŽ OOooo-----

[SBPtrial08-09b]

- (b) The information below is about hydrocarbon J

- Empirical formula of J is CH₂
- Mass of 1 mole of J = 28 g
- Produce by dehydration of alcohol

- (i) Determine the molecular formula for hydrocarbon J. [2M]

[Relative atomic mass: C=12, H=1]

- (ii) Describe an experiment to prepare hydrocarbon J in the laboratory from its corresponding alcohol. In your answer, include the diagram of the apparatus set-up, materials used, and procedure. [8M]

-----oooOO aĐaŽ OOooo-----

[SBPtrial04-08] {Translate}

- (a) Compound J contains 82.75% of carbon and 17.25% of hydrogen of the mass.

- (i) Determine the empirical formula and the molecular empirical formula of compound J. [4M] [Relative atomic mass: C=12, H=1; Relative molecular mass of J is 58]

(ii) Based on the answer in 2(a)(i), draw all the possible the structural formula of compound J and name the isomer. [4M]

(b) Two bottle with no label, contain the sikloheksane and sikloheksene. Describe the chemical test to determine the both of the liquid. [5M]

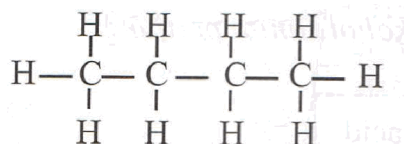
(c) **butanoate acid**
Pure of ethanol
Concentrated sulphuric acid

By using the substances below and the suitable apparatus, state how you can prepare the ethyl butanoate in the laboratory. In your explanation, state the observation and write the chemical equation for the chemical reaction involve. [7M]

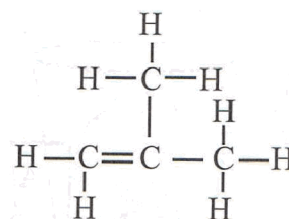
-----oooOO aĐaŽ OOooo-----

[SPM11-09]

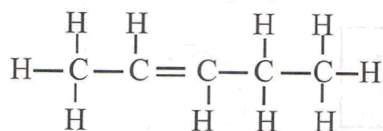
(a) Diagram 9 shows the structural formulae of hydrocarbons A, B, C, D and E



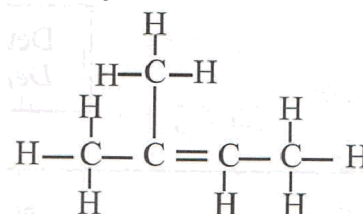
Hydrocarbon A



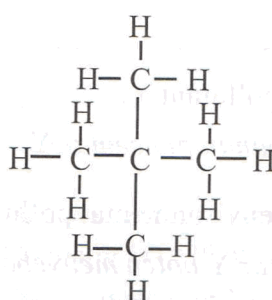
Hydrocarbon B



Hydrocarbon C



Hydrocarbon D



Hydrocarbon E

Diagram 9

(i). Based on Diagram 9, identify which hydrocarbons are isomers and state the names of the isomers. [3M]

(ii). Describe briefly a chemical test to differentiate between hydrocarbons A and C. [3M]

(iii). Alkanes and alkenes burnt completely in oxygen to produce water and carbon dioxide gas.

By using one of the hydrocarbons in Diagram 9, write a balanced chemical equation for the complete combustion for that hydrocarbon.

Calculate the volume of carbon dioxide gas produced when 0.02 mol of that hydrocarbon is completely burnt. [4M]

[Molar volume at room conditions = 24.0 dm³ per mol]

(b) Table 9 shows the properties of three carbon compounds, X, Y and Z.

Carbon compound	Properties
X	Insoluble in water Decolourises the brown colour of bromine water
Y	Soluble in water Reacts with magnesium to produce hydrogen gas
Z	Soluble in water Burns with a non-sooty blue flame

Table 9

Based on the information in Table 9, state which of the carbon compound is an alkene, an alcohol or a carboxylic acid. [3M]

(c) Alcohols react with carboxylic acids to form esters and water.

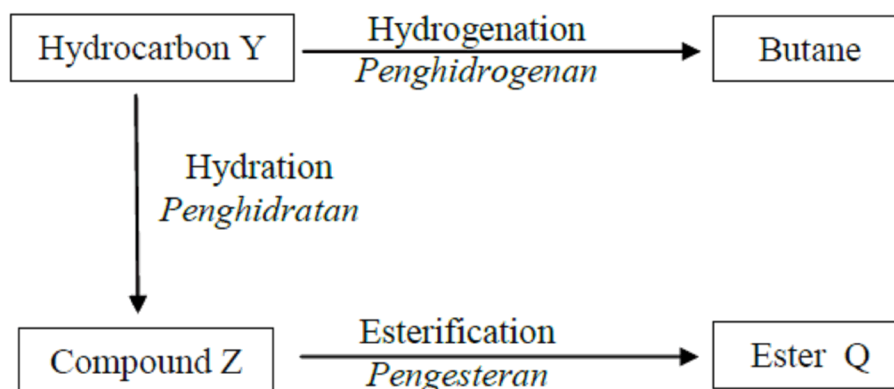
By using one named example of an alcohol and one named example of a carboxylic acid, describe the preparation of an ester in the laboratory.

In your description, include the chemical equation for the reaction. [7M]

-----oooOO aÑaŽ OOooo-----

[SBPtrial11-09]

Diagram 9 shows a series of reactions involving hydrocarbon Y.



(a) Based on Diagram 9, [3M]

- state the general formula,
- state the functional group and
- draw the structural formula

of hydrocarbon Y.

(b) Write the chemical equation to show the hydration process of hydrocarbon Y. State the conditions needed for the process that takes place. [3M]

(c) Table 9 shows the result of a chemical test to differentiate between hydrocarbon Y and butane.

Procedure	Observation
Bromine water is added to hydrocarbon Y.	Brown bromine water decolourised.
Bromine water is added to butane.	Brown bromine water remains unchange.

Table 9

Explain why there is difference in the observations. [4M]

(d) A student intends to prepare an ester Q from the reaction between compound Z and named carboxylic acid.

Describe a laboratory experiment to prepare the ester. Your answer should include the following : [10M]

- A list of material
- Procedure of the experiment
- Observation and chemical equation
- Name of the ester produced

-----oooOO aĐaŽ OOooo-----

[MRSM09-09]

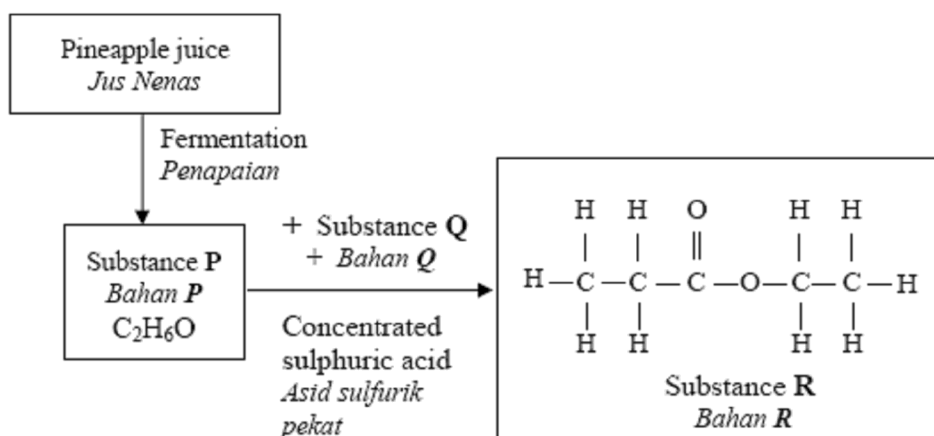
(a) Hexane and hexene are hydrocarbon compounds from different homologous series. The combustion of these two compounds produce different amount of soot. Explain the difference based on the percentage of carbon by mass. [4M]
[Relative atomic mass: C=12, H=1]

(b) (i) Explain the following statement:

An aqueous solution of ethanol does not conduct electricity while an aqueous solution of ethanoic acid conducts electricity. [3M]

(ii) Describe one chemical test to differentiate ethanol from ethanoic acid. [3M]

(c) Diagram 9 shows the flow chart for preparation of substance P, C₂H₆O from pineapple juice through fermentation process.



Describe an experiment to produce substance R from pineapple juice in the laboratory. In your description, name P, Q and R and include the chemical equations involved. [10M]

-----oooOO aĐaŽ OOooo-----

[SBPTrial10-08]

Diagram 8 shows the flow chart for the reactions of propan-1-ol.

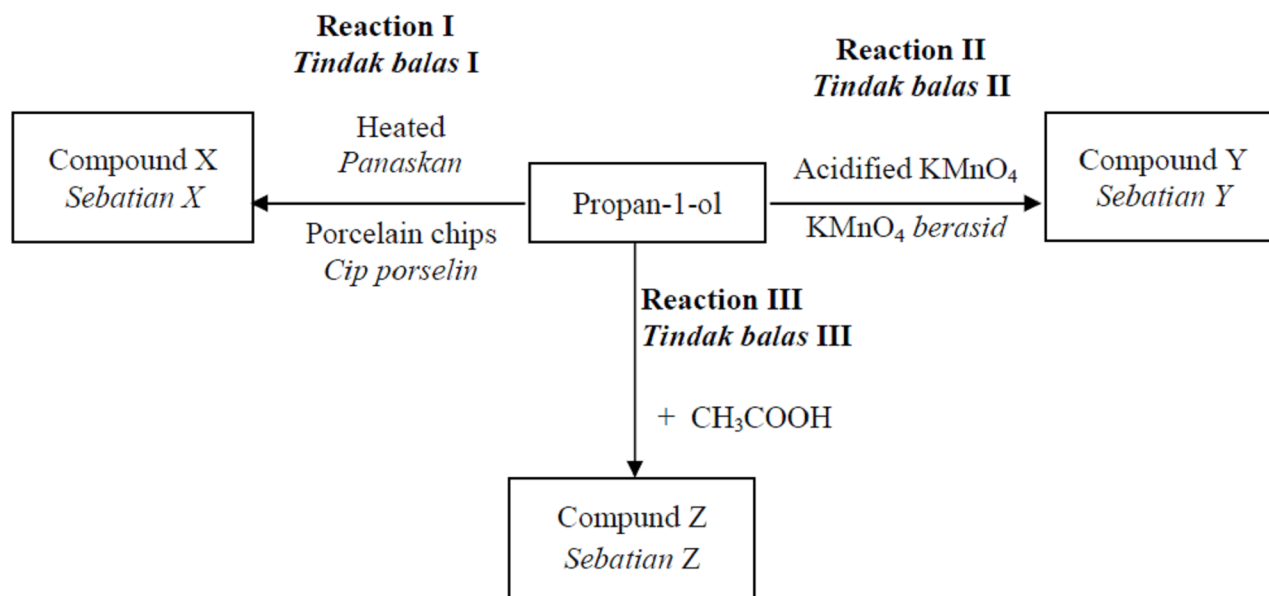


Diagram 8

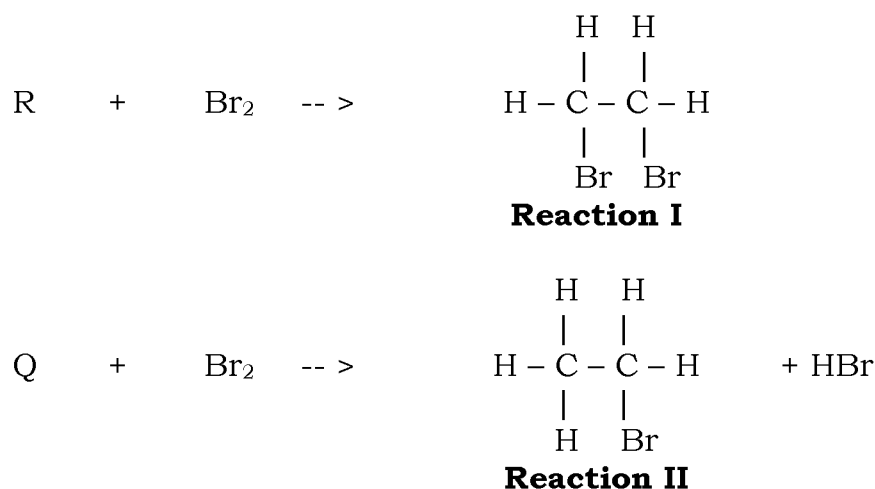
- (a) Draw the structural formula and state the name of compound X, Y and Z. [6M]
- (b) State the type of Reaction I and explain a chemical test to identify compound X [3M]
- (c) Compound X can be converted into propan-1-ol. Write the chemical equation and state the condition needed for the reaction. [3M]
- (d) In Reaction III, describe the method of preparing compound Z in the laboratory. [4M]
- (e) When calcium carbonate is added to compound Y, carbon dioxide gas is liberated. [4M]
- State the name of the functional group of compound Y
 - Write the general formula of compound Y
 - Write the chemical equation of the reaction

-----oooOO aĐaŽ OOooo-----

[MRSM06-09]

The content of alcoholism exhaled air from a drunk driver can be detected using a detector containing potassium dichromate (VI).

- (a) Explain the chemical processes occurred in the detector and write the chemical equations for the reactions involved. [4M]
- (b) Diagram 9 shows two equations representing two different reactions.

**Diagram 9**

- (i) Name compounds R and Q.
- (ii) Compare and contrast between reaction I and reaction II. [6M]
- (c) The following equation represents the formation of an ester produced from the reaction between glacial ethanoic and an alcohol.



Describe an experiment how to prepare a **named** ester.
 State how to detect the presence of ester and write the chemical equation involved.
 [10M]

-----oooOO aĐaŽ OOooo-----

[SBPmidyearF508-10]

Diagram 10.1 shows how compound M is formed from ethanoic acid and propanol.

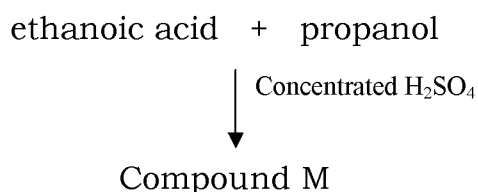


Diagram 10.1

(a) Based on the information given [10M]

(i) what is the role of concentrated sulphuric acid, H_2SO_4 in this reaction.

(ii) name the reaction for the preparation of compound M.

(iii) write the chemical equation for the reaction of propanoic acid with ethanol

(iv) draw structural formula and give name for compound M.

(v) state two special characteristics for compound M.

(vi) draw the structures of the two isomers of propanol.

(b) Table 10.2 shows the results of latex coagulation.

Procedure	Observations
Latex is left under natural condition	Latex coagulates
Ammonia solution is added to latex	Latex does not coagulate

Table 10.2

(i) Explain why there is a difference in this observation. [6M]

(ii) Explain how vulcanization of rubber can improve the weakness of natural rubber. [4M]

-----oooOO aĐaŽ OOooo-----

[MRS03-10]

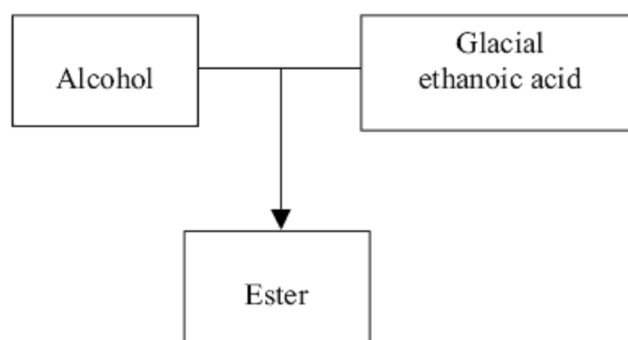


FIGURE 7

Figure 7 shows the formation of ester from the reaction between glacial ethanoic acid and any alcohol. Various types of esters can be formed from this reaction.

(a) Name one possible ester that can be formed and write the chemical equation involved. [2M]

(b) With the help of a labelled diagram, describe the steps that you would take to prepare the named ester in (a) in the laboratory. [10M]

Substance	Molecular formula
V	C_6H_{14}
T	C_6H_{12}

Table 6

(c) Table 6 shows two hydrocarbon compounds V and T which are colourless liquids at room temperature. Describe two chemical tests used in the laboratory to differentiate liquid V and T. [8M]

-----oooOO aĐaŽ OOooo-----

[SPM09-07]

(a) Table 7 shows some information about three members of a homologous series.

Member of homologous	Boiling point (°C)	Preparation	Oxidation product
Ethanol	78	$C_2H_4 + H_2O \rightarrow C_2H_5OH$	Ethanoic acid
Propanol	97	$C_3H_6 + H_2O \rightarrow C_3H_7OH$	Propanoic acid
butanol	118	$C_4H_8 + H_2O \rightarrow C_4H_7OH$	Butanoic acid

Table 7

Based table 7, state and explain five characteristics of a homologous series. [10 M]

(b) The following information is about an organic compound X.

- Empirical formula is CH_2O
- Relative molecular mass is 60
- Reacts with calcium carbonate to produce a type of gas that turns lime water chalky

Based on the information given:

(i) determine the molecular formula of X. [2M]
[Relative atomic mass: C=12, H=1, O=16]

(ii) State the name of the homologous series for X and explain your answer. [2 M]

(iii) Write the balanced chemical equation for the reaction of compound X with calcium carbonate. [2M]

(c) Diagram 7 shows the structural formulae of hydrocarbon of compounds P and Q.

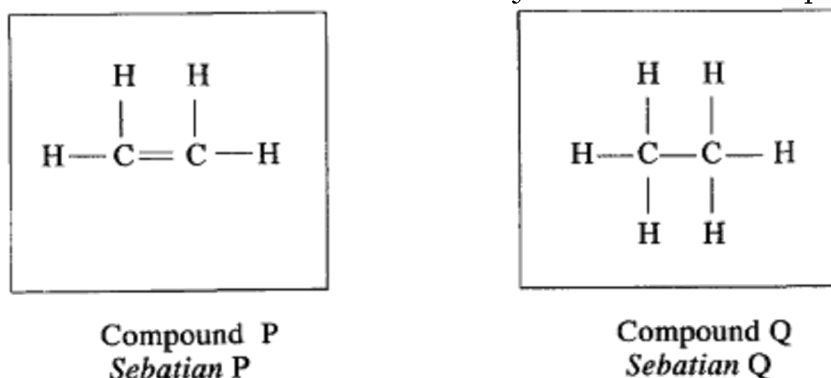
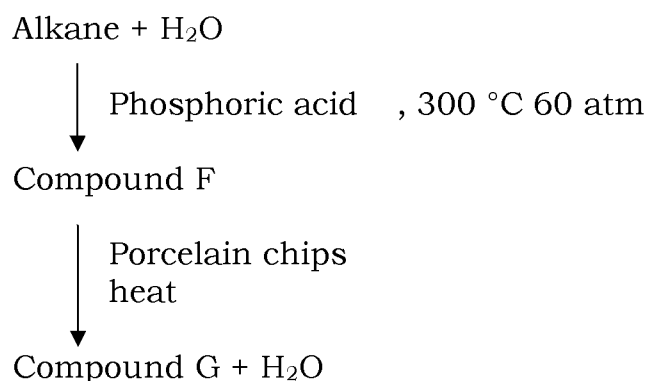


Diagram 7

Compare and contrast these two hydrocarbons based on their structures. [4M]

[SPM07-09]

(a) Diagram 9 shows how compound G is formed from alkane.

**Diagram 9**

(i) Name one alkane that has less than four carbon atoms.

Draw its structural formula. [2M]

(ii) Based on the answer in 9(a)(i), what is the name of compound F and compound G? [2M]

(iii) State three chemical properties of compound F and three chemical properties of compound G. [6M]

(b) Alkanes, alcohols and carboxylic acids are three different homologous series.

Construct a table to show the general formula, the functional group and the name of a member in each of the series. [10 M]

-----oooOO aĐaŽ OOooo-----

[SPM04-08]

Diagram 2.1 shows changes of a carbon compound involving a series of reactions.

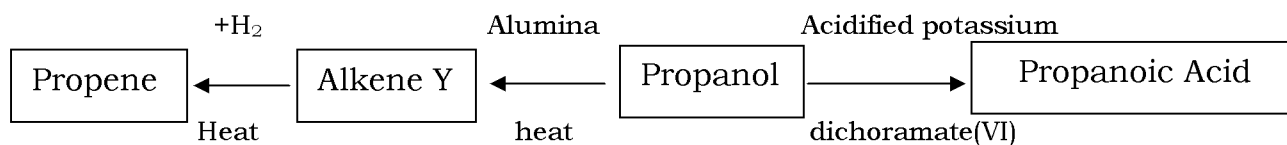


Diagram 2.1

(a) Draw the structural formulae of two propanol isomers.

Name both isomers. [4M]

(b) The information below is regarding alkene Y:

- Carbon 85.7 %
- Hydrogen 14.3%
- Relative molecular mass = 42
- Relative atomic mass of H = 1 and C = 12

Based on the information of the alkene Y:

- Determine the molecular formula
- Draw the structural formula
- Name the alkene
- Write the general formula for its homologous series. [8M]

(c)(i) Table 2.2 shows the results of a test to differentiate between alkane Y and propane.

Procedure	Observations
Bromine water is added to alkene Y	Brown colour is decolourized
Bromine water is added to propane	Brown colour remains

Table 2.2

Explain why there is difference in these observations. [4M]

(ii) Table 2.3 shows results of latex coagulation.

Procedure	Observations
Propanoic acid is added to latex	Latex coagulations immediately
Latex is left under natural conditions	Latex coagulations slowly

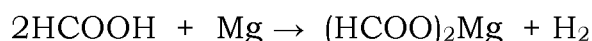
Table 2.3

Explain why there is a difference in these observations. [4M]

-----oooOO aĐaŽ OOooo-----

[MRSM08-10]

(a) Methanoic acid is used in rubber industries to coagulate latex. It reacts with magnesium according to the following equation:



[Relative Atomic Mass: C=12, O=16, H=1; molar volume of gas at room temperature and pressure is $24 \text{ dm}^3 \text{ mol}^{-1}$]

(i) Calculate the maximum volume of hydrogen gas released if 50 cm^3 of 0.2 mol dm^{-3} methanoic acid is reacted with 5 g magnesium. [3M]

(ii) A sweet smelling substance is formed when methanoic acid is reacted with ethanol, $\text{C}_2\text{H}_5\text{OH}$. Name the substance and draw the structural formula. [2M]

(b) Natural rubber is obtained from rubber tree as shown in Diagram 10.1. Aeroplane tyres as shown in Diagram 10.2 are produced by vulcanizing the natural rubber. Compare the following properties between natural rubber and vulcanized rubber. [5M]

- Elasticity
- Heat resistance
- Explain the differences

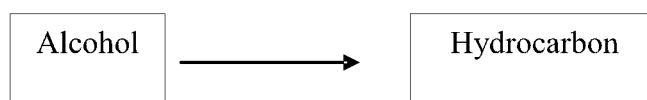


Diagram 10.1



Diagram 10.2

(c) Alcohol can undergo dehydration process as follows:



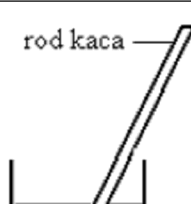
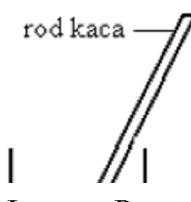
Describe a laboratory experiment to carry out the dehydration of a named alcohol. Your answer should include: [10M]

- Procedure
- Equation
- Confirmation of product

-----oooOO aĐaŽ OOooo-----

[MRSM06-08c]

(c) Table 8.2 shows two experiments that had been carried out on latex.

Experiment	Apparatus setup	Observation
I	Glass rode rod kaca  Latex + sulfuric acid	white solid is formed
II	Glass rode rod kaca  Latex + Potassium hydroxide solution	No changes

Describe briefly regarding the difference in the observations obtained. [5M]

-----oooOO aĐaŽ OOooo-----

[MRSM05-09]

(a) Diagram 4 show a tyre of a vehicle developed from vulcanized natural rubber.

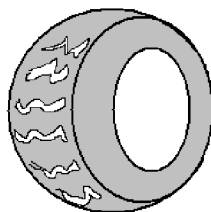


Diagram 4

(i) Explain why vulcanization process can change the structure of natural rubber. [2M]

(ii) Compare the characteristics of nonvulcanized natural rubber with vulcanized natural rubber. [2M]

b) Table 2 shows the result of 2 experiments to differentiate between oil A and oil B

Experiment	Observation
<p>glass rod</p> <p>Oil A</p> <p>$\text{KMnO}_{4(\text{ak})}$ alkalined solution</p>	Purple colour decolourised to become colourless
<p>Glass rod</p> <p>Oil B</p> <p>$\text{KMnO}_{4(\text{ak})}$ alkalined solution</p>	Purple colour doesn't change

Table 2

(b) (i) Name the types of oil present in oil A and oil B. [1M]

(ii) Based on the observation above, compare and contrast between oil A and oil B. In your answer include the possible example for each of the oil. [5M]

(c) Sugar cane juice can be processed to produce fuel that is renewable and nature friendly. Describe an experiment to produce the fuel. In your description include [10M]

- Substance required
- Procedure to carry out the experiment
- Confirmation test on the yield formed

Structure {Paper03}

[SPM08-01]

Diagram 1 shows three sets, Set I, Set II and Set III, of the apparatus set-up for an experiment to investigate the effect of ethanoic acid and ammonia solution on the coagulation of latex.

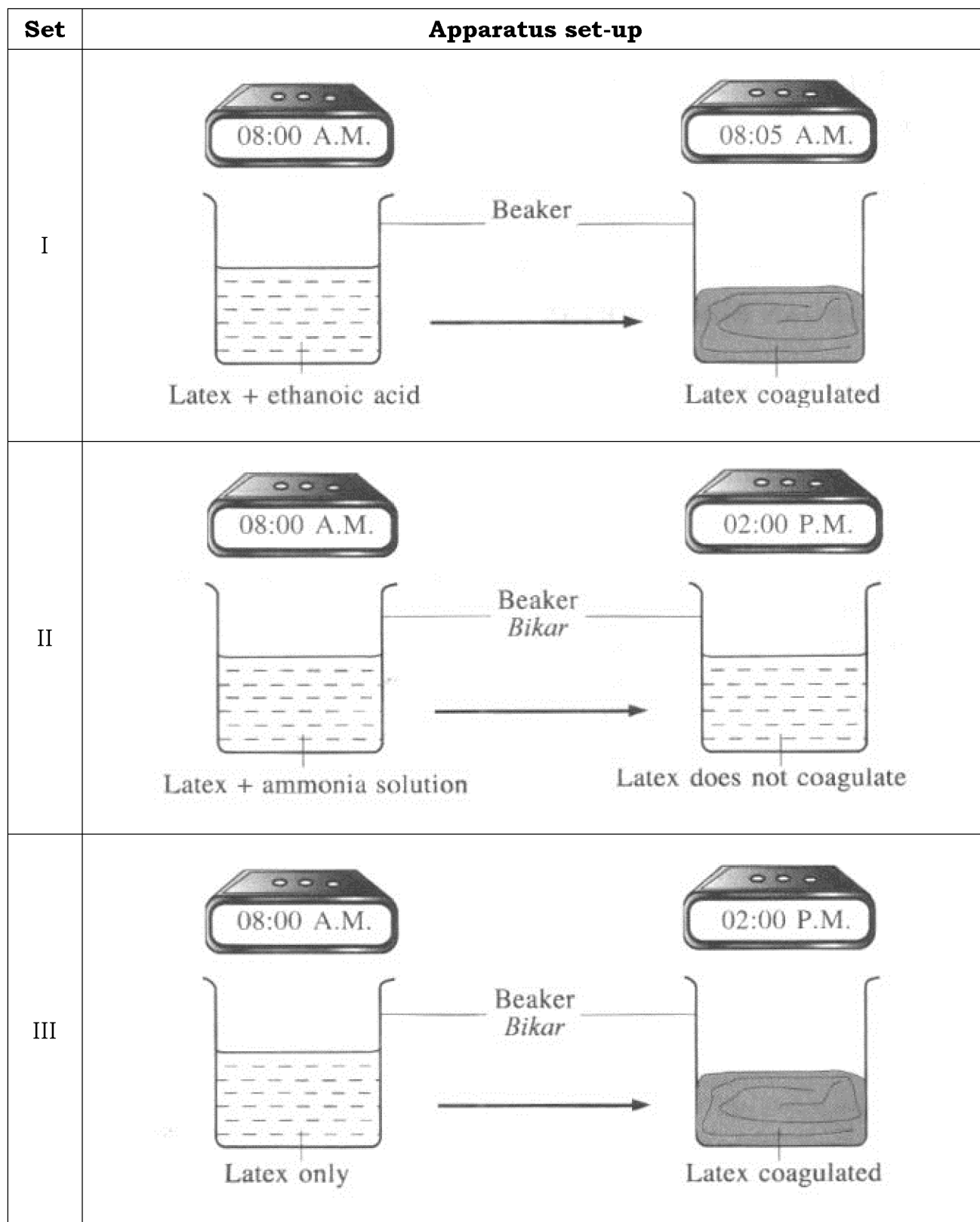


Diagram 1

(a) State **one** hypothesis based on Set I and Set II.

.....
.....
.....

(b) Record the time taken for the latex to coagulate in Set I and Set III.

Set I :

Set III :

(c) Construct a table to record the time taken for coagulation in Set I and Set III.

(d) State **one** observation that can be obtained from each set of this experiment.

Set I :

.....

Set II :

.....

Set III :

.....

(e) State the operational definition for the coagulation of latex.

.....
.....
.....

(f) For this experiment, state:

(i) The manipulated variable :

(ii) The responding variable :

(iii) The constant variable :

(g) (i) Excess hydrochloric acid added to the beaker in Set I after 2:00 p.m. What observation can be made about the latex?

.....
.....
.....

(ii) Explain the answer in 1(g)(i).

.....
.....
.....

(h) Explain why latex can coagulate without acid in Set III.

.....
.....
.....

(i) (i) Explain why the latex in Set I coagulates faster than the latex in Set III.

.....
.....
.....

(ii) The following is a list of chemical substance:

- Nitric acid
- Sodium hydroxide
- Methanoic acid
- Potassium hydroxide

Classify this substance into substances that can coagulate latex and substances that cannot coagulate latex.

Essay {Paper03}

[SPM06-02]

Diagram 2 shows the stretching phases of a vulcanized rubber and an unvulcanized rubber stands.

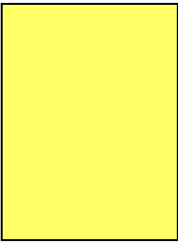
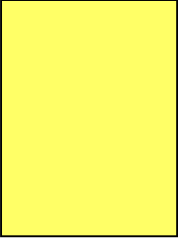
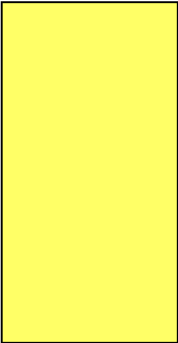
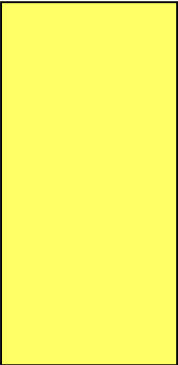
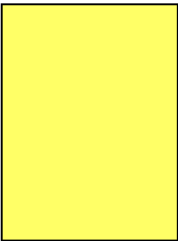
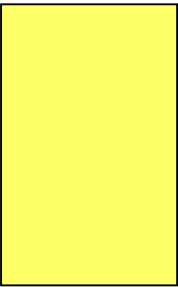
Stretching phases	Length of vulcanized rubber	Length of unvulcanized rubber
Before	 45 mm	 45 mm
During	 59 mm	 60 mm
After	 45 mm	 50 mm

Diagram 2

Plan an experiment to compare one characteristic shown in diagram 2 for both types of rubber.

Your planning should include the following aspects: [17M]

- Aims of the experiment
- All the variables
- Statement of the hypothesis
- List of substances and apparatus
- Procedure of the experiment
- Tabulation of data

[SPM04-03]

The fruits in Figure 3.1 produce natural esters which have various tastes and scents.

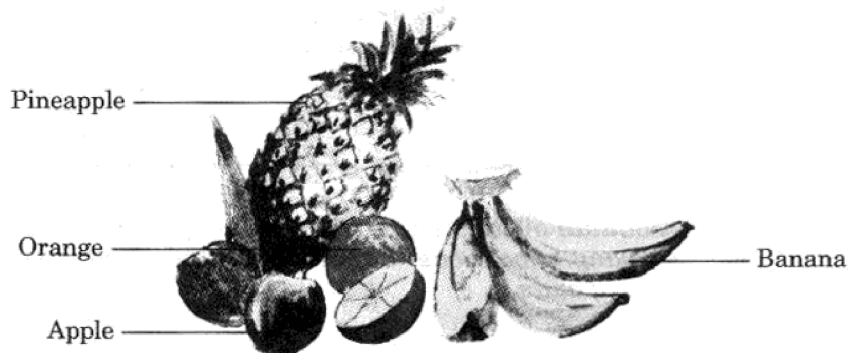


Figure 3.1

Esters can be produced in the laboratory when an alcohol reacts with a carboxylic acid. Table 3.2 shows types of alcohol and carboxylic acid used to produce various esters. These esters have a similar scent to the esters in fruits.

Alcohol	Carboxylic acid	ester	Fruit
Ethanol	Butanoic acid	Ethyl butanoate	Pineapple
Methanol	Butanoic acid	Methyl butanoate	Apple
Octanol	Ethanoic acid	Octyl ethanoate	Orange
pentanol	Ethanoic acid	Pentyl ethanoate	Banana

You are required to prepare **two** different types of ester using the same carboxylic acid with different alcohols. The two esters must be chosen from those shown in Table 3.2. Use the information in Table 3.2 to plan a laboratory experiment to prepare the esters and describe their scents.

Your explanation should include all the followings: [17M]

- Aims of the experiment
- Statement of hypothesis
- List o substances and apparatus
- Procedures of the experiment
- Tabulation of data

[MRSMTrial06-03]

A heavy duty glove which is made of vulcanized rubber is more durable than a surgical glove which is made of unvulcanized rubber.

Referring to the situation above, plan a laboratory experiment to compare the elasticity of prepared vulcanized and unvulcanized rubber.

Your planning must include the following items: [17M]

- (a) Statement of the problem
- (b) All the variables
- (c) Hypothesis
- (d) Lists of substances and apparatus
- (e) Procedure
- (f) Tabulation of data

[SBPTrial06-03] {Translate}

Natural rubber more soft and less elastic compare to vulcanised rubber.

Merujuk kepada pernyataan di atas, rancangkan satu eksperimen dalam makmal untuk membandingkan kekenyalan getah tervulkan dengan getah tak tervulkan.

Referring to statement above, plan a laboratory experiment to investigate the elastic property between vulcanized rubber and natural rubber.

Your planning should include the following aspects: [17M]

- (a) Statement of the problem
- (b) All variables
- (c) List of materials and apparatus
- (d) Procedure of the experiment
- (e) Tabulation of data