

3. A small amount of glass wool soaked in propanol is placed in a boiling tube.
4. The boiling tube is clamped horizontally
5. The unglazed porcelain chips are placed in the middle section of the boiling tube.
6. The boiling tube is closed with a stopper fitted with a delivery tube
7. The unglazed porcelain chips are heated strongly. Then, the glass wool is warmed gently to vaporize the propanol.
8. The gas released is collected in a test tube.

[Description of the chemical test to the gas collected in the test tube.]

9. Add 1 cm³ of bromine water and shake well // Add 1 cm³ of acidified potassium manganate(VII) solution and shake well.

[Observation]:

10. Reddish brown colour of bromine decolourised. // Purple colour of potassium manganate(VII) solution decolourised

11. Chemical equation: $C_3H_7OH \rightarrow C_3H_6 + H_2O$

1. Propane.
- 2 [Calculation of percentage of carbon by mass for propane and value]
- 3 [Calculation of percentage of carbon by mass for propene and value]
- 4 [Conclusion] Propene has a higher percentage of carbon by mass, so propene produces more soot.

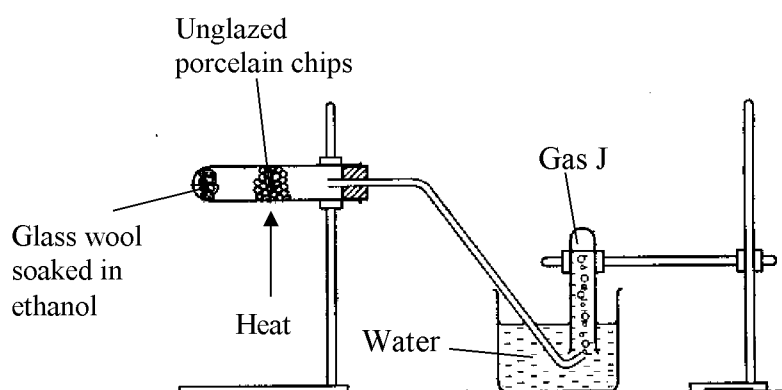
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[SBPtrial08-09b]

- (b)(i) 1. Relative Molecular mass of $(CH_2)_n = 28$
 $(12 + 2)n = 28$
 $n = 2$

2. Thus, molecular formula = C_2H_4

(ii)



1. A small amount of glass wool soaked in J is placed in a boiling tube.
2. The boiling tube is clamped horizontally
3. The unglazed porcelain chips are placed in the middle section of the boiling

tube.

4. The boiling tube is closed with a stopper fitted with a delivery tube

5. The unglazed porcelain chips are heated strongly. Then, the glass wool is warmed gently to vaporize the ethanol.

6. The gas released is collected in a test tube.

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[SBPtrial04-08] {Translate}

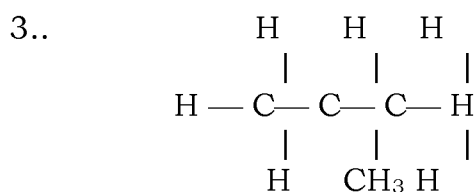
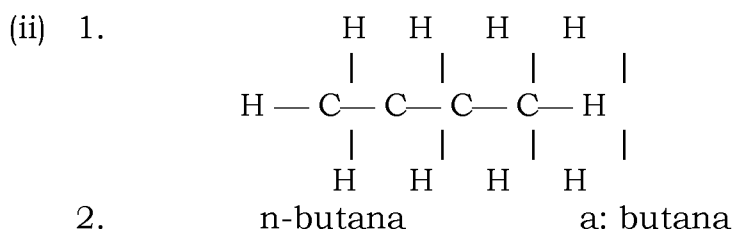
(a)(i)	Karbon	Hidrogen
% jisim	82.75	17.25
1. Bil mol	$\frac{82.75}{12} = 6.89$	$\frac{17.25}{1} = 17.25$
2. Nisbah mol terkecil	$\frac{6.89}{6.89} = 1$	$\frac{17.25}{6.89} = 2.5$
Formula empirik	C_2H_5	$= 5$

$$(C_2H_5)_n = 58$$

$$(24 + 5)n = 58$$

$$n = 2$$

$$\text{Formula molekul} = C_4H_{10}$$



1. 2-metilpropana

- (b) 1. Masukkan [2-5]cm³ cecair sikloheksana dan sikloheksena dalam tabung uji berasingan
 2. Tambahkan beberapa titis air bromin(larutan kalium manganat(VII) berasid
 3. Goncangkan
 4. Warna perang (ungu) tidak berubah menunjukkan sikloheksana
 5. Warna perang (ungu) kepada tanpa warna menunjukkan sikloheksena

- (c) 1. Tambahkan [2-5]cm³ etanol kepada [2-5]cm³ asid butanoik dalam sebuah tabung uji/didih
 2. Goncangkan campuran itu
 3. Tambahkan beberapa titis asid sulfurik pekat.

4. Hangatkan
5. Dengan cepat tuangkan kandungan itu ke dalam bikar berisi air
6. Hasil berbau wangi/harum
7. Persamaan: $C_3H_7COOH + C_2H_5OH \rightarrow C_3H_7COOC_2H_5 + H_2O$
* terima persamaan menggunakan formula struktur

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[SPM11-09]

(a)(i) isomer : C and D

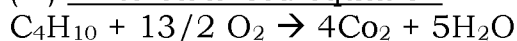
Name isomer

C: pent – 2 – ene // 2 – pentene

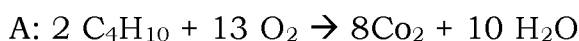
D: 2 – methylbut-2-ene// 2 methyl-2-butene

- (ii) 1. add of bromine water to compound A and C respectively
2. the brown colour of bromine water is decolourised by compound C
3. compound A does not change the brown colour of bromine water

(iii) write balanced equation



1. correct formula of reactant and product
2. balanced equation



Calculation

3. mole of carbon dioxide
4. volume of carbon dioxide gas and correct unit

Mole : $0.02 \times 4 // 0.08$

Volume : $0.08 \times 24 \text{ dm}^3 // 1.92 \text{ dm}^3$

(b) Alkene : X
Alcohol : Z
Carboxylic acid : Y

- (c) 1. Name alcohol and carboxylic
2. procedure
3. observation

Cth answer

1. Alcohol : ethanol//methanol
Carboxylic acid : Ethanoic acid

Procedure

3. pour (2 – 3cm³) of glacial ethanoic acid into a boiling tube
4. add (2 – 5 cm³) of absolute ethanol into the acid// boiling tube
5. add (1 cm³/ a few drops of concentrated sulphuric acid to the mixture
6. heat the mixture
7. chemical equation



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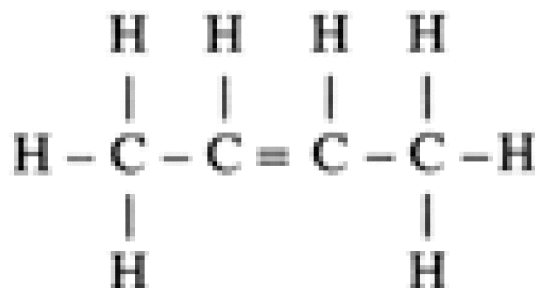
[SBPtrial11-09]

(a) General formula : C_nH_{2n} n= 2,3.....

Functional group : Double bond between carbon atoms/ C=C

Structural formula : [But-1-ene // But-2-ene]

Example :



Condition:

Temperature : 300 °C

Pressure : 60 Atm

Catalyst: Concentrated Phosphoric acid

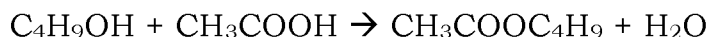
- (c)
1. Y is unsaturated hydrocarbon
 2. Y react with bromine
 3. Butane is saturated hydrocarbon
 4. butane does not react with bromine

(d) Sample answer

List of material : Butanol, [etanoic acid], concentrated sulphuric acid

Procedure :

1. Pour[2- 5]cm³ butanol into a boiling tube
2. Add [2 – 5] cm³ of ethanoic acid
3. Add 3 drops of concentrated sulphuric acid .
4. Heat the mixture carefully over a small flame
5. Boil the mixture slowly about 2 to 3 minutes.
6. Pour the content of the boiling tube into the beaker containing water
7. Smell the contents of the beaker.
8. Observation : Fruity smell substance produced



9. Correct formulae of reactants

10. Correct formulae of products

11. Name : Butyl ethanoate

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[MRSM09-09]

(a) Percentage of C atom in Hexane

$$= \frac{6(12)}{6(12) + 14} \times 100 \% = 83.72 \%$$

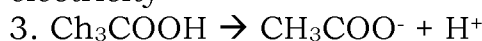
Percentage of C atom in Hexene

$$= \frac{6(12)}{6(12) + 12} \times 100 \% = 85.71 \%$$

- Percentage of carbon by mass in hexene is higher than hexane
- hexene produce more soot than hexane

(b) (i) 1. Ethanol solution consists of “ethanol” molecules// ethanol does not ionise in water

2. Ethanoic acid ionises/ dissociates in water to form free moving ions which conduct electricity



(ii) 1. Put magnesium ribbon (any metal which is more electropositive/ metal carbonate) into test tube containing ethanoic and ethanoic acid respectively

2. Effervescence/ bubbles of gas in the test tube of ethanoic acid

3. No changes in test tube of ethanol

(c) 1. Yeast is added into pineapple juice solution in a conical flask

2. The mixture is left for 3 days

3. Filter the mixture

4. The filtrate is distilled and ethanol is collected at 78 °C



6. Q is propanoic acid

7. Add to ethanol and few drop of concentrated sulphuric acid

8. Heat under reflux// heat gently using water bath

9. Ethyl propanoate is produced



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[SBPTrial10-08]

(a)

Compound X Propene	$ \begin{array}{ccccccc} & \text{H} & & \text{H} & & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & = & \text{C} & - & \text{C} & - \text{H} \\ & & & & & & \\ & & & & & \text{H} & \end{array} $
Compound Y Propanoic acid	$ \begin{array}{ccccccc} & \text{H} & & \text{H} & & & \text{O} \\ & & & & & & // \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & \\ & & & & & & \backslash \\ & \text{H} & & \text{H} & & & \text{OH} \end{array} $
Compound Z Propyl ethanoate	$ \begin{array}{ccccccc} & \text{H} & & & & \text{H} & \text{H} & \text{H} \\ & & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & & \text{O} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & \backslash & & & & & & & & \\ & \text{H} & & & & \text{O} & & \text{H} & & \text{H} & & \text{H} & & \end{array} $

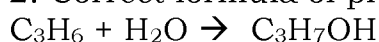
(b) 1. Dehydration reaction

2. Add bromine // potassium manganate (VII) solution

3. Brown colour of bromine decolourised // purple colour of KMnO_4 change to colourless

(c) 1. Correct formula of reactant

2. Correct formula of product



3. Condition needed for the reaction:

- Phosphoric acid
- Temperature $300\text{ }^\circ\text{C}$
- Pressure 60 atm

(d) 1. Pour 2 cm³ of glacial ethanoic acid in a boiling tube2. Add 2 cm³ of propan-1-ol to the acid

3. Slowly and carefully add concentrated sulphuric acid

4. Heat the mixture

(e) 1. Functional group : carboxyl group / -COOH

2. General formula: $\text{C}_n\text{H}_{2n+1}\text{COOH}$

3. Correct formula of reactant and product

4. Balanced



[MRSM06-09]

- (a) 1. Potassium dichromate (VI) oxidise alcohol/ethanol to ethanoic acid
 2. Observation : purple to colourless
 3. equation : $C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$
 4. ionic equation : $Cr_2O_7^{2-} + 14H^+ + 6e \rightarrow 2Cr^{3+} + 7H_2O$

(b) (i) R : ethane and Q : ethane

(ii)

Difference	Reaction 1	Reaction 2
Condition reaction	Room temperature	With ultra light
Name of reaction	Addition	Substitution
Product name	1,2 – dibromoethane	Bromoethane
Rate of reaction	Higher	lower

Similarity

- substance R and Q is hydrocarbon
- observation is same, the brown change to colourless

- (c) 1. Name ester : ethyl ethanoate
 2. Substance : glacial ethanoic acid, pure ethanol, concentrated sulphuric acid
 3. apparatus : test tube, bunsen burner, thong

Procedure

- 40 cm³ of ethanol is added into 20 cm³ of ethanoic acid
- mixture was stir
- 3 drop of concentrated sulphuric acid was added
- heat the mixture of solution gently
- the products was poured into beaker contain the water
- observation : sweat smeel is produces// colourless liquid layer produce on the top of water

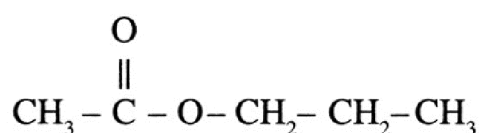


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[SBPmidyearF508-10]

- a (i) catalyst
 (ii) esterification
 (iii) $CH_3COOH + C_3H_7OH \rightarrow CH_3COOC_3H_7 + H_2O$
 Correct reactant
 Correct product

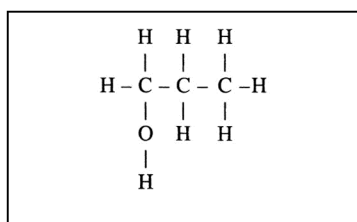
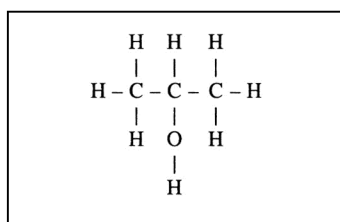
(iv)



Ethyl propanoate

- (v) Sweet smell/fruity smell/fragrant smell
 //insoluble in water/soluble in organic solvent
 //colourless
 //less dense than water
 any two properties (1+1)

(vi)



b (i)

- **Bacteria will produce lactic acid/H⁺ ions** which **neutralize negatives charge** of the **protein membrane**/ rubber molecules
- The **rubber molecules will be collide** with each other and cause **protein membrane broken**
- **Rubber polymer** are **released and lump together / coagulate**
- **Hydroxide ions/OH⁻** from ammonia solution **will neutralise H⁺** produced by acid
- The **protein membrane remains negatively charged**
- The **rubber particles repel each others**/ the rubber polymers cannot combine and coagulate

(ii)

- The presence of cross-linkage of sulphur atoms between the rubber molecule
- When vulcanized rubber is stretched and release, the cross-linkage will pull the chain back to their original arrangement
- Diagram
- Improves the elasticity and strength of the rubber / make vulcanized rubbers more resistant to heat /organic solvent



or

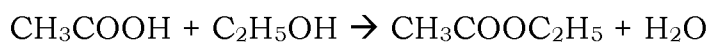
Resistant to oxidation :

- The **presence of cross-linkage of sulphur atoms between the rubber molecule**
- Diagram
- C=C in vulcanized rubber is less than C=C in the unvulcanized rubber,
- so vulcanize rubber is more resistant to oxidation

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[MRSM03-10]

(a) sample : name ester : ethyl ethanoate



(b) Diagram :

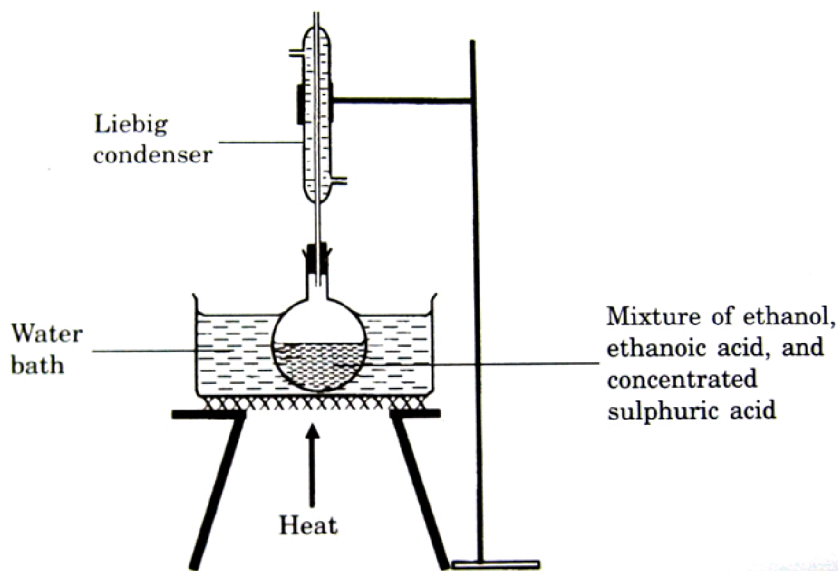


Figure 4

Procedure :

1. Pour 20 cm³ propanol into a round bottom flask
2. Then add 20 cm³ of ethanoic acid
3. Add 10 drops of concentrated sulphuric acid.
4. Then setup the apparatus like the diagram above
5. Heat the mixture carefully over a small flame
6. Boil the mixture slowly about 2 to 3 minutes.
7. Pour the content of the boiling tube into the beaker containing water
8. Smell the contents of the beaker.
9. Observation : Fruity smell substance produced

- (c) 1. Put 2cm³ of solution V and T in 2 different test tube.
 2. the add 4 drop of bromine water into both test tube
 3. shake both of test tube
 4. test tube contain V solution will change from brown to colourless but T solution not

1. Put 2cm³ of solution V and T in 2 different test tube.
2. the add 4 drop of acidified potassium manganate(VII) solution into both test tube
3. shake both of test tube
4. test tube contain V solution will change from purple to colourless but T solution not

-----oooOO aĐaŽ OOooo-----

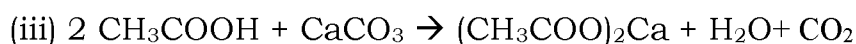
[SPM09-07]

- (a) 1. All members contain same functional group
 2. Can be presented by a general formula
 3. The difference between one member and the next member is $-\text{CH}_2-$, carbon atom per molecule
 4. all member has similar chemical properties
 All can be prepared by using a similar method preparation.

- (b) (i) (empirical empirical) n = molar mass
 $(12+2+16)n = 60$
 $30n = 60$
 $n = 2$

molecular formula = $\text{C}_2\text{H}_4\text{O}_2$

(ii) Carboxylic acids

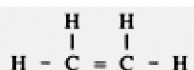


- (c) 1. both have two carbon atom permolecule (ethyl group).
 2. however, P is an unsaturated compound (alkene) with one double bond and
 3. Q is a saturated compound (alkane) with no double bond
 4. Q has 6 H but P has 4 H

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[SPM07-09]

(a) (i)



Ethene

[the other accepted answer is propene]

(ii) Compound F is ethanol
 Compound G is ethene

- (iii) Chemical properties of compound F (ethanol)
1. Ethanol **burns** completely in air (oxygen) to produce **carbon dioxide and water**.
 2. Ethanol react with **acidified potassium dichromate(VI)** to produce **ethanoic acid**.
 3. Ethanol undergoes **dehydration** to form **ethene**.
 4. Ethanol react with **carboxylic acid** to produce **ester**.
- [Choose any three.]

Chemical properties of compound G (ethene)

1. Ethene **burns** completely in air to produce **carbon dioxide and water**.
2. Ethene undergoes **hydrogenation** to produce **ethane**
3. Ethene reacts with **water** to form **ethanol**.
4. Ethene undergoes **polymerization** to form **polyethane**

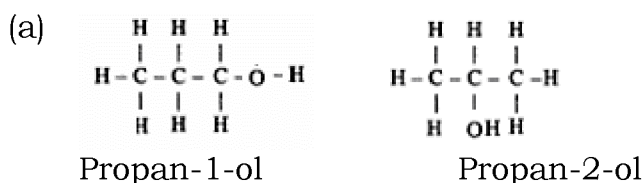
[Choose any three. For other accepted answers please refer to text book page 46]

(b)

Homologous series	General formula	Functional group	Member
Alkene	C_nH_{2n}	Carbon – carbon double bonds (or $C = C$)	Ethene
Alcohol	$C_nH_{2n+1}OH$	Hydroxyl group (or $-OH$)	Ethanol
Carboxylic acid	$C_nH_{2n+1}COOH$	Carboxyl group (or $COOH$)	Ethanoic acid

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[SPM04-08]



(b) (i)

$$\text{No. of mol of carbon atom} = \frac{85.7}{12} = 7.083$$

$$\text{No. of mol of hydrogen atom} = \frac{14.3}{1} = 14.1$$

$$\frac{\text{No. of mol of carbon atom}}{\text{No. of mol of hydrogen atom}} = \frac{7.083}{14.3} = \frac{1}{2} \text{ (integer)}$$

$$\therefore \text{Empirical formula} = CH_2$$

Molecular formula of alkene Y : C_nH_{2n}

Given relative molecular mass = 42

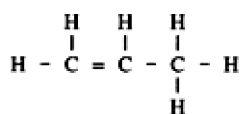
$$\text{Hence } 12n + 2n = 42$$

$$14n = 42$$

$$n = 3$$

\therefore molecular formula of alkene Y is C_3H_6

(ii)



(iii) Propene

(iv) C_nH_{2n}

- (c) (i) 1. Alkene Y is an **unsaturated hydrocarbon** with a carbon-carbon double bond.
 2. When bromine water is added to alkene Y, brown colour is decolourised because addition reaction (or bromination) occurs.
 3. Propane is a saturated hydrocarbon with carbon – carbon single bond.
 4. No reaction occurs when bromine is added.
- (ii) 1. Propanoic acid contains **H⁺ ions**
 2. The H⁺ ions **immediately neutralized** the **negative charge** on the protein membrane.
 3. Hence when propanoic acid is added, latex coagulates immediately.
 4. **Bacteria** from the air **enter the latex**.
 5. The growth and spread of **bacteria produce lactic acid slowly**.
 6. Hence when latex is left under natural conditions, it coagulates slowly.

-----oooOO aĐaŽ OOooo-----

[MRSM08-10]

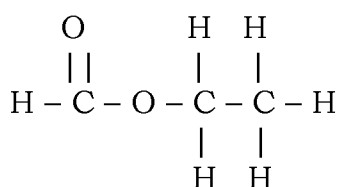
(a) (i) 1. Mol acid = $MV/1000 = 0.2 \times 50/1000 = 0.01 \text{ mol}$

2. Ratio between methanoic acid to Hydrogen gas

2 mol : 1 mol
 0.01 mol : 0.005 mol

3. Volume = mol X molar volume at RC
 = $0.005 \times 24 = 0.12 \text{ dm}^3$

(ii) Ethyl methanoate



(b)

Unvulcanised rubber	Vulcanised rubber
Less elastic (easily stretched but difficult to return to its original shape)	More elastic (Difficult to stretch but easily returns to its original shape)
Non-heat resistant	More heat resistant

In the vulcanised rubber, have the sulphur atoms that cross-link with the rubber molecules through string covalent bonds. This will lessen the ability of the rubber molecule chains from slipping on top of one another and from becoming loose.

- (c) 1. A small amount of glass wool soaked in propanol is placed in a boiling tube.
 2. The boiling tube is clamped horizontally
 3. The unglazed porcelain chips are placed in the middle section of the boiling tube.
 4. The boiling tube is closed with a stopper fitted with a delivery tube

5. The unglazed porcelain chips are heated strongly. Then, the glass wool is warmed gently to vaporize the propanol.
6. The gas released is collected in a test tube.

[Description of the chemical test to the gas collected in the test tube.]

8. Add 1 cm³ of bromine water and shake well // Add 1 cm³ of acidified potassium manganate(VII) solution and shake well.

[Observation]:

9. Reddish brown colour of bromine decolourised. // Purple colour of potassium manganate(VII) solution decolourised

10. Chemical equation: $C_3H_7OH \rightarrow C_3H_6 + H_2O$

-----oooOO aĐaŽ OOooo-----

[MRSM06-08c]

In experiment I:

1. sulphuric acid ionise to hydrogen ion, H⁺ that neutral the negative charge at negative membrane lateks
2. the particles of lateks collapse with one other
3. membrane of lateks leakage and the polymer of lateks is coagulate

In Experiment II:

4. Potassium hydroxide will ionise and produce hydroxide ions that neutral H⁺ from bacteria activity
5. the negative membrane of lateks is maintain.

-----oooOO aĐaŽ OOooo-----

[MRSM05-09]

- (a) (i) 1. In the vulcanised rubber, have the sulphur atoms that cross-link with the rubber molecules through string covalent bonds.
2. This will lessen the ability of the rubber molecule chains form slipping on top of one another and from becoming loose.

(ii)

Unvulcanised rubber	Vulcanised rubber
Softer	Stronger and tougher
Less elastic (easily stretched but difficult to return to its original shape)	More elastic (Difficult to stretch but easily returns to its original shape)
Non-heat resistant	More heat resistant

- (b) (i) oil A : alkene // butane
- oil B : alkane // butane

- (ii) 1. oil A is Butene and oil B is butane
 2. oil A and oil B is hydrocarbon
 3. oil A has double bond between atom C to another atom C
 4. that can be added by acidified potassium manganate(VII) solution
 5. oil B has only single bond between atom C to another atom C, that saturated. And no reaction between acidified potassium manganate(VII) solution.

(c) 1. Substance : glucose, yeast

Apparatus

250 cm³ conical flask, 150 cm³ conical flask, 500 cm³ beaker, 50 cm³ measuring cylinder, distillation flask, stopper with delivery tube, 0 – 110 °C thermometer, Liebig condenser, fractionating column, retort stand and clamp, tripod stand, wire gauze, burner, rubber tubing, filter funnel, boiling tube

Procedure :

2. Dissolve about 20 g of glucose in 150 cm³ of distilled water contained in a clean flask
3. Add about 10 g of yeast to mixture and shake well
4. close the conical flask with a stopper connected with a delivery tube.
5. leave the apparatus in a room temperature for 2 days.
6. from time to time. Observe any changes taking place
7. record your observation.
8. After that, filter the contents of the conical flask. Pour the filtrate into a distillation flask.
9. heat the filtrate in a water bath and collect the products.
10. Examine the colour and smell of the distillate collected.
 - it has colourless and sharp smell => prove the ethanol

-----oooOO aĐaŽ OOooo-----