

**General Instructions**

Working time – 45 minutes

Write your answers using a pen in the spaces provided.

All diagrams should be completed in pencil.

Full working is required for any questions requiring calculations.

The mark value for each question is shown beside the question

Total \_\_\_\_ / 31 marks.

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**Question 1. (H2, H8, H9, H10) (10 marks)**

**(A) Study the models of a range of carbon compounds that are displayed around the room.**

(i) Identify the model labelled A by its **common** name. 1M

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(ii) Draw the **structural** formula (not condensed) for the compound shown by model A. 1M

(iii) (a) Draw the **condensed structural** formula for the monomer of the compound shown in model B. 1M

(b) Draw a segment of the **structural** formula (not condensed), showing three monomers, for the addition polymer formed from compound B. 2 M

Practical/Processing Information Task

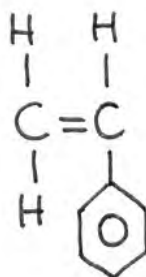
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- (iv) Outline the procedure used to convert the compound modelled by C into the compound modelled by D. 2M  
(a) Write an equation, using structural formulas, for this reaction.

(b) Identify a third reagent that would be required.

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- (B) Study the diagram shown here that models a molecule of an organic compound.



- (ii) Identify the **systematic/IUPAC** name for this compound. 1M

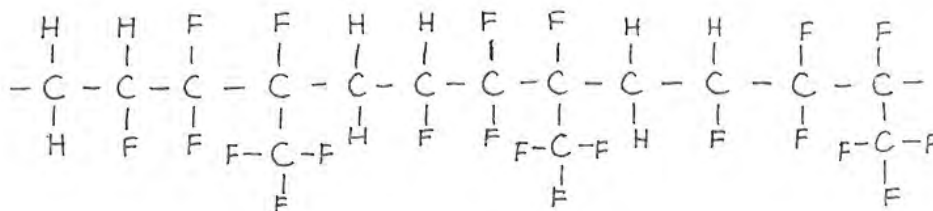
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- (iii) Write the **molecular** formula for this compound. 1M

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Practical/Processing Information Task

(C) Viton is an addition polymer used in the manufacture of gaskets. Part of the structure of the polymer is shown.



Identify the two monomers that react together to form viton.

Circle the best answer from (A), (B), (C) or (D).

1M

	<i>Monomer 1</i>	<i>Monomer 2</i>
A	$  \begin{array}{c}  \text{F} & \text{F} \\    &   \\  \text{C} = & \text{C} \\    &   \\  \text{F} & \text{F}-\text{C}-\text{F} \\  &   \\  & \text{F}  \end{array}  $	$  \begin{array}{c}  \text{H} & \text{H} \\    &   \\  \text{C} = & \text{C} \\    &   \\  \text{H} & \text{F}  \end{array}  $
B	$  \begin{array}{c}  \text{F} & \text{H} \\    &   \\  \text{C} = & \text{C} \\    &   \\  \text{F} & \text{F}  \end{array}  $	$  \begin{array}{c}  \text{H} & \text{F} & \text{F} \\    &   &   \\  \text{C} = & \text{C} - & \text{C} - \text{F} \\    & &   \\  \text{H} & & \text{F}  \end{array}  $
C	$  \begin{array}{c}  \text{H} & \text{F} \\    &   \\  \text{C} = & \text{C} \\    &   \\  \text{H} & \text{F}  \end{array}  $	$  \begin{array}{c}  \text{H} & \text{F} & \text{F} \\    &   &   \\  \text{C} = & \text{C} - & \text{C} - \text{F} \\    & &   \\  \text{H} & & \text{F}  \end{array}  $
D	$  \begin{array}{c}  \text{F} & \text{F} & \text{F} \\    &   &   \\  \text{F} - \text{C} - & \text{C} = & \text{C} \\    & &   \\  \text{F} & & \text{F}  \end{array}  $	$  \begin{array}{c}  \text{H} & \text{F} \\    &   \\  \text{C} = & \text{C} \\    &   \\  \text{H} & \text{H}  \end{array}  $

## Practical/Processing Information Task

**Question 2. (H11-H14) (7 marks)**

A student carried out a first-hand investigation to compare the reactivity of an alkane with its corresponding alkene using bromine water.

- (a) Identify a suitable alkane and alkene for this investigation. 1M

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- (b) Describe the qualitative changes that would be observed by the student. 2M

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- (c) Identify this investigation as destructive or non-destructive. Justify your answer. 1M

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- (d) Identify the independent variable. 1M

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- (e) A risk assessment was carried out. The student read the Materials Safety data Sheet (MSDS) for bromine water. A portion of the MSDS is shown below.

Formula	Br <sub>2</sub> (aq.)
Physical properties	Form: amber coloured liquid smelling strongly of bromine Stability: Stable Melting point: close to 0 C (depends upon bromine concentration) Boiling point: close to 100 C (depends upon bromine concentration - bromine is lost as the temperature is raised) Specific gravity: typically around 1.03, but changes slightly with bromine concentration
Principal hazards	*** Bromine vapour is released from bromine water solutions when they are open to the air. This vapour is harmful if inhaled. *** Bromine water is harmful if you swallow it and can cause eye damage if splashed into the eyes. Prolonged contact with the skin may lead to burns.

- Propose TWO safety precautions that the student should have followed. 2M

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**Question 3. (H8, H10, H12, H13, H14) (14 marks)**

- (a) Which of the three reading resources that you have been provided with about ethanol contains the most reliable information? Justify your choice. 2M

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- (b) Identify the systematic / IUPAC name of the following compound. 1M



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- (c) Write a balanced equation for the fermentation of glucose to ethanol. 1M

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- (d) One tonne of sugar (sucrose) was processed to produce ethanol.. At the end of the fermentation stage of the process, 15% of the sugar had been converted to ethanol.

- (i) Write the net equation for this process. 1M

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- (ii) Calculate the mass of ethanol produced. 4M

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(e) Assess the potential of ethanol as an alternative fuel and discuss the advantages and disadvantages of its use.

5M

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END OF PAPER

Ensure that your student identification is written on each page

# Chemistry HSC, 2008, Task 1

## 1. (A) (i)

Criteria	Marks
Identifies model A as <i>vinyl chloride</i>	1

## 1. (A) (ii)

Criteria	Marks
Draws the structural formula for vinyl chloride showing all of the covalent bonds and all of the atoms (nb. If other types of formulae are also given, then no marks are awarded)	1

## 1. (A) (iii) (a)

Criteria	Marks
Draws the condensed structural formula for 1-bromo-2-butene. (nb. If other types of formulae are given, then no marks are awarded)	1

## 1. (A) (iii) (b)

Criteria	Marks
Draws the structural formula of a section of the polymer formed when 1-bromo-2-butene undergoes addition polymerisation. The diagram needs to show * three monomer units correctly linked through the 'opening up' of the double bonds * 6 carbon atoms linked together as the 'backbone' of the polymer with side groups off each carbon * an 'open' bond on each of the end carbon atoms * no atoms gained or lost in the process of addition polymerisation	2
Draws a structural formula that correctly indicates how the monomer units will add together but is missing one or more of the 'dot' points above	1

## 1. (A) (iv) (a)

Criteria	Marks
Writes the equation for the dehydration of 1-propanol into propene and water using structural formulae for all three chemicals	1
Writes the equation for the dehydration of 1-propanol into propene and water using structural formulae for two of the three chemicals	0.5

## 1. (A) (iv) (b)

Criteria	Marks
Identifies that a catalyst is required (eg. <i>concentrated sulfuric acid</i> ) OR Identifies that water is the third reagent involved	1
Identifies sulfuric acid as the catalyst	0.5

## 1. (B). (i)

Criteria	Marks
Identifies the compound by its systematic name ( <i>ethenyl benzene</i> ) (no marks awarded if the common name is also given)	1

## 1. (B) (ii)

Criteria	Marks
Gives the correct molecular formula – $C_8H_8$	1

## 1. (C)

Criteria	Marks
Selects one of the correct alternatives – A, B or D	1

## 2. (a)

Criteria	Marks
Selects a specific alkane and alkene (using correct nomenclature) that contains a corresponding number of carbons in each molecule.	1
Selects an alkane and alkene (that does not necessarily contain specific numbering).	0.5

## 2. (b)

Criteria	Marks
Provides two qualitative observations that indicate change, specifying the appearance before and after.	2
Provides one qualitative observation that indicates a change AND one observation.	1.5
Provides two observations.	1
Provides one observation.	0.5

## 2. (c)

Criteria	Marks
Identifies the investigation as destructive AND provides a justification for this decision.	1

Identifies the investigation as destructive.	0.5
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### 2. (d)

Criteria	Marks
Indicates the independent variable . ( 'Saturation" or by indicating the use of an unsaturated and a saturated hydrocarbon)	1

### 2. (e)

Criteria	Marks
Two precautions adequately communicated (by indicating that these would be steps that are carried out by the experimenter)	2
One precaution and one hazard described.	1.5
One precaution described.	1

### 3. (a)

Criteria	Marks
Identifies resource 3 ( <i>Chemistry 2 HSC Course textbook</i> ) as the most reliable AND Justifies the resource based on lack of bias or no political or major financial gain	2
Identifies resource 3 ( <i>Chemistry 2 HSC Course textbook</i> ) as the most reliable OR Identifies incorrect resource AND Justifies this resource based on lack of bias or no political or major financial gain	1

### 3. (b)

Criteria	Marks
Identifies the compound as <i>2-hexanol</i> (or hexan-2-ol)	1

### 3. (c)

Criteria	Marks
Writes a balanced symbol equation for the fermentation of glucose (molecular or structural formulae)	1

### 3. (d) (i)

Criteria	Marks
Writes a balanced symbol NET equation for the fermentation of sucrose ( $C_{12}H_{22}O_{11}$ )	1

### 3. (d) (ii)

Criteria	Marks
Calculates the mass of ethanol produced as 80.75 kg showing full, logical working. Working needs to include the following steps – <ul style="list-style-type: none"> <li>• mass of sucrose that actually ferments (<i>150 000 000 g</i>)</li> <li>• moles of sucrose that ferments (<i>438.217... mol</i>)</li> <li>• mole of ethanol produced (4 X) (<i>1752.86... mol</i>)</li> <li>• mass of ethanol produced (<i>80.75 kg</i>)</li> </ul>	4
Three of the above points. (An error at one step then carries through to subsequent steps)	3
Two of the above points.	2
One of the above points.	1

### 3. (e)

Criteria	Marks
Lists 2 advantages AND 2 disadvantages AND Provides a judgement with regards to ethanol as an alternative	5
Lists 2 advantages AND 2 disadvantages AND No judgement	4
Only makes a judgement OR Only provides three or less advantages or disadvantages combined	1-3