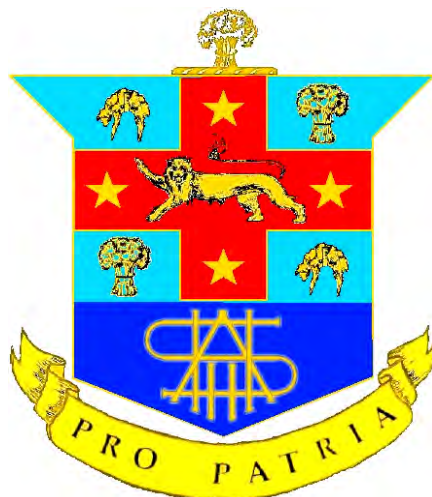


Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_



**2004**

**Half Yearly Examination**

# **HSC Chemistry**

## **General Instructions**

- Working time – 90 minutes
- 5 min reading time
- Write using blue or black pen
- Draw diagrams using pencil
- Approved calculators may be used
- Write your name and teacher's name on each answer sheet

**Total marks**      **50**

Attempt all questions

Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

**Hurlstone Agricultural High School 2004**  
**HSC Assessment Task 2**  
**Practical and Process Exam**

**Question 1**

A student performed the following experiment.

- *A conical flask had 245 mL of water placed in it.*
  - *The conical flask was placed over a spirit burner using a retort stand and clamp.*
  - *Some methanol was added to the spirit burner. It was weighed and found to have a total mass of 40.5 g.*
  - *The temperature of the water was measured and found to be 19.0° C.*
  - *The spirit burner was placed under the flask and lit. The methanol burned with a yellow flame and a small amount of soot was deposited on the bottom of the conical flask.*
  - *The water reached a temperature of 27.5°C. At this point, the flame was quickly extinguished.*
  - *The spirit burner was re-weighed. Its mass was found to be 37.8 g.*
- (a)** In the space below, draw and label a scientific diagram of the apparatus described above as you would have it assembled in class in order to make accurate measurements.

**(3 marks)**



Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

**Question 2**

- (a) Write a balanced equation (including states) for the fermentation of glucose to ethanol. **(1.5 mark)**

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- (b) Describe 3 conditions which best promote the fermentation of sugar. **(1.5 mark)**

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**[question 3 is on the next page]**

Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

**Question 3**

Displayed on the table in the laboratory are models of two hydrocarbon compounds. They are labelled A and B.

- (a) Identify hydrocarbons A and B respectively. **(2 marks)**

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- (b) Draw the full structural diagrams for A and B respectively. **(2 marks)**

- (c) Draw the structural formula of the product formed when bromine water is added to A (not in the presence of UV light). **(1 mark)**

- (d) What would you observe if bromine water is added to B **NOT** in the presence of UV light? **(1 mark)**

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- (e) Compare the rates of reaction of A and B when bromine water is added to each separately in the presence of UV light. **(2 marks)**

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Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

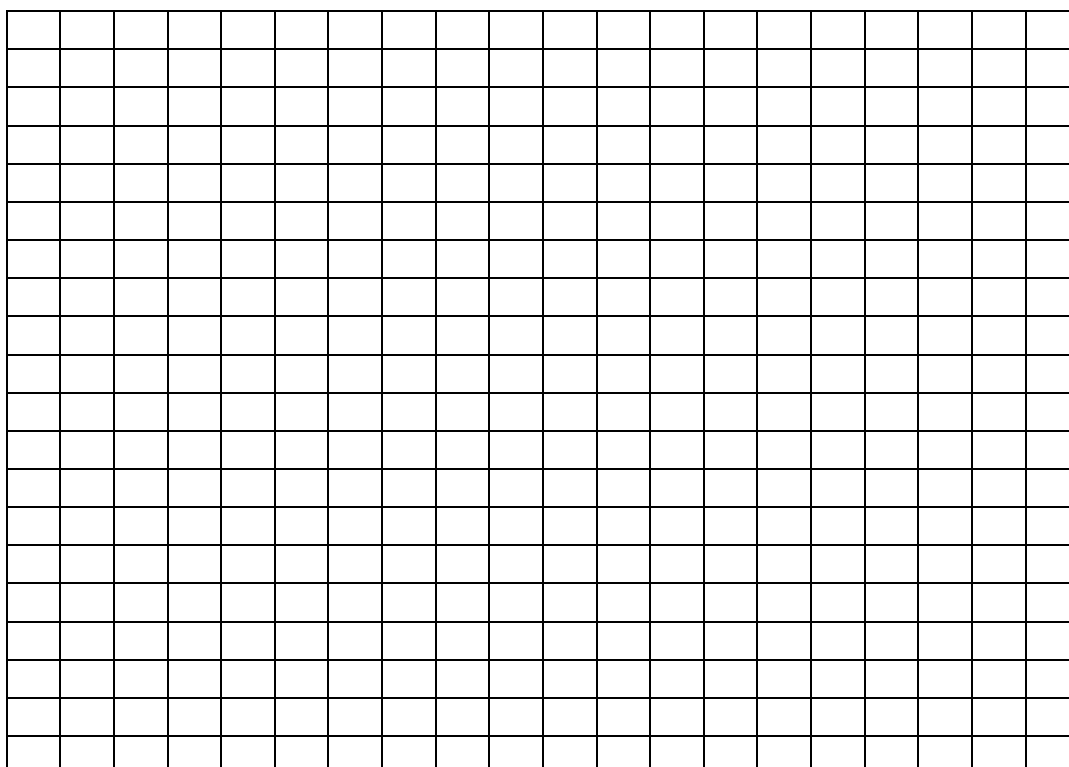
**QUESTION 4**

A student carried out an experiment to monitor the mass changes involved when a softdrink is de-carbonated. The student weighed a sealed can of softdrink and found its mass to be 400 g. The can was then placed on a set of scales which was connected to a data logger . The can was then opened and the mass of the can and its contents was recorded every hour over a 12 hour period. The following results were obtained.

<b>Time after opening can (hours)</b>	<b>Mass of can and contents (g)</b>
<b>0</b>	<b>400</b>
<b>1</b>	<b>396</b>
<b>2</b>	<b>393</b>
<b>3</b>	<b>391</b>
<b>4</b>	<b>390</b>
<b>5</b>	<b>390</b>
<b>6</b>	<b>390</b>
<b>7</b>	<b>390</b>
<b>8</b>	<b>390</b>
<b>9</b>	<b>390</b>
<b>10</b>	<b>390</b>
<b>11</b>	<b>390</b>
<b>12</b>	<b>390</b>

- (a) Assuming that all the mass loss was due to the release of carbon dioxide draw a graph of the mass of carbon dioxide released vs the time after opening.

**(5 marks)**



Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

- (b) Describe what happens to the rate of production of carbon dioxide as time proceeds. **(1 mark)**

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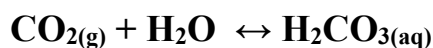
- (c) Calculate the volume that the carbon dioxide when released, would occupy at STP. **(2 marks)**

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- (d) The following reaction describes the equilibrium of carbon dioxide in water



Given that the forward reaction above is exothermic explain in terms of Le Chetalier's principle what would happen to the slope of the graph if the temperature was lowered. **(3 marks)**

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**[question 5 is on the next page]**

Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

### Question 5

Plant growth is affected by the pH of soils. Table 1 shows the pH range of a number of indicators.

Table 1

Indicator	Colour(low pH-high pH)	Approximate pH range
Thymol blue	Red/yellow	1.2-2.8
Bromocresol green	Yellow/blue	3.8-5.4
Methyl red	Pink/yellow	4.4-6.2
Bromothymol blue	Yellow/blue	6.0-7.6
Phenol red	Yellow/red	6.8-8.4
Phenolphthalein	Colourless/red	8.3-10.0
Alizarin yellow	Yellow/lilac	10.1-12.0

Table 2 shows the soil pH values below which growth of the listed plants is restricted by the pH.

Table 2

Crop	pH
Potatoes	4.9
Apples	5.0
Cabbages	5.4
Wheat	5.5
Beans	6.0
Lettuce	6.1

Describe how indicators could be used to check whether the pH of the soil in a particular area is suited for growing beans. In your answer you should identify which indicator/s could be used and justify your choice. **(4 mark)**

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Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

### Question 6

Sulfur was burnt in a gas jar of oxygen. There was enough oxygen for all the sulfur to react. The product of this reaction was dissolved in water and tested with four indicators.

Properties of indicators:

Indicator	Colour in low pH	pH change	Colour in high pH
Methyl orange	red	3.1-4.4	yellow
Litmus	red	5.0-8.0	blue
Bromothymol blue	yellow	6.0-7.6	blue
Phenolphthalein	colourless	8.3-10.0	pink

The following partially completed table of results is shown below:

Indicator	Colour in product solution
Methyl orange	red
Litmus	
Bromothymol blue	
Phenolphthalein	

(a) Is the product solution acidic, basic or neutral? **(1 mark)**

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(b) What colour would the phenolphthalein turn in the product solution? **(1 mark)**

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(c) Write a balanced chemical equation for the combustion of sulfur.  
Including the states of the reactants and products. **(2 mark)**

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Teacher Name: \_\_\_\_\_

Student: \_\_\_\_\_

- (d) If 16 g of sulfur was burnt, calculate the volume of gas produced at 0°C and 100 kPa. **(3 mark)**

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**Question 7**

Describe, using equations where appropriate, a natural process which produces nitrogen dioxide. **(3 marks)**

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[ end of paper ]