Student Number	
Mark /	

Chemistry Assessment

Task 2 Term 1 2010

Theory

Production of Materials
Acidic Environment
& Chemical Monitoring

General Instructions

- **Reading time – 5 minutes**
- **Working time – 55 minutes**
- **Write using black or blue pen**
- **Write your Student Number at the top of this page and on pages 7,9 and 11.**
- **Board-approved calculators may be used**

A data sheet and a periodic table are provided at the back of the paper.

Total Marks – 40

Part A – 10 marks

- Attempt Questions **1 – 10**
- Allow about **10** minutes for this part

Part B – 30 marks

- Attempt Questions **11 – 17**
- Allow about **45** minutes for this part

Part A: Multiple Choice:
Attempt Questions 1 – 10
Allow about 10 minutes for this part

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

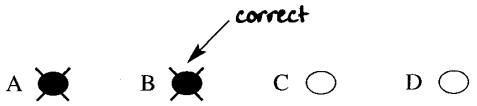
Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word ~~correct~~ and drawing an arrow as follows.



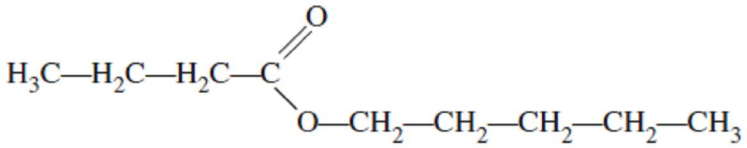
▸ Mark your answers for the multiple choice questions in the multiple choice grid on page 6

Multiple Choice (*Mark your answers on the multiple choice grid on page 6*)

1.

	Scientist	*Idea*
(A)	Davy	Oxygen is present in all acids
(B)	Lavoisier	An acid ionizes in water to produce hydrogen ions
(C)	Arrhenius	Metals can displace hydrogen from acids
(D)	Bronsted-Lowry	Acids donate protons

2. Give the systematic name for this organic compound.



(A) Butyl pentanoate

(B) Pentyl butanoate

(C) Propyl pentanoate

(D) Pentyl propanoate

3. Which of the following chemicals would be best suited as a catalyst for esterification?

(A) Sulfuric acid

(B) Zeolites

(C) Vanadium (V) oxide

(D) Platinum

4. Which chemical would be most useful in cleaning up an acid spill in the laboratory?

(A) vinegar

(B) concentrated sodium hydroxide solution

(C) sodium hydrogen carbonate

(D) salt

5. At a particular temperature, iodine trichloride dissociates into iodine gas and chlorine gas according to the following equation:

$2\ ICl_3(g) \rightleftharpoons I_2(g) + 3Cl_2(g) \quad \Delta H = +240\ kJ$

Which of the following sets of conditions would produce the highest yield of chlorine and iodine?

(A) High temperature, low pressure

(B) Low temperature, high pressure

(C) Low temperature, low pressure

(D) High temperature, high pressure

6. For what purpose is an iron - based chemical required in the Haber process?

(A) Increasing the yield of ammonia which is produced

(B) Increasing the activation energy of the reaction

(C) Increasing the quality of the ammonia which is produced

(D) Increasing the rate at which ammonia is produced.

7. Which of the following is a transuranic element ?

(A) Actinium

(B) Americium

(C) Antimony

(D) Astatine

8. Which instrument is used to detect radiation from radioactive isotopes ?

(A) Data logger

(B) pH probe

(C) Scintillation counter

(D) Ion-selective electrode

9. A student recorded some observations in a first-hand investigation :

(i) A chilled bottle of soft drink was opened and left on a side bench.
(ii) Initially there was a rapid effervescence of bubbles.
(iii) After a lengthy period of time the bubbling ceased.

Why did the bubbling cease after a period of time ?

(A) Air had neutralized the bubbles.

(B) Bubbles dissolved in the water.

(C) The gas was more soluble at higher temperatures and lower pressures.

(D) The gas was less soluble at higher temperatures and lower pressures.

10. A student measured the mass of an unopened bottle of soda water and recorded its mass to be 375.00 g. The student then opened the bottle and left it standing for 2 hours on a table top. The student then reweighed the bottle and recorded the new mass to be 372.25 g. Assuming the mass loss was due to decarbonation of the soft drink bottle, what would be the volume of carbon dioxide gas released by the soft drink at 25^0C and 100 kPa ?

(A) 0.775 L

(B) 1.55 L

(C) 3.09 L

(D) 7.75 L

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Student Number ……..

Part A . Answer grid for multiple choice questions **Total .....**

1.	A O	B O	C O	D O
2.	A O	B O	C O	D O
3.	A O	B O	C O	D O
4.	A O	B O	C O	D O
5.	A O	B O	C O	D O
6.	A O	B O	C O	D O
7.	A O	B O	C O	D O
8.	A O	B O	C O	D O
9.	A O	B O	C O	D O
10	A O	B O	C O	D O

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Student Number ……

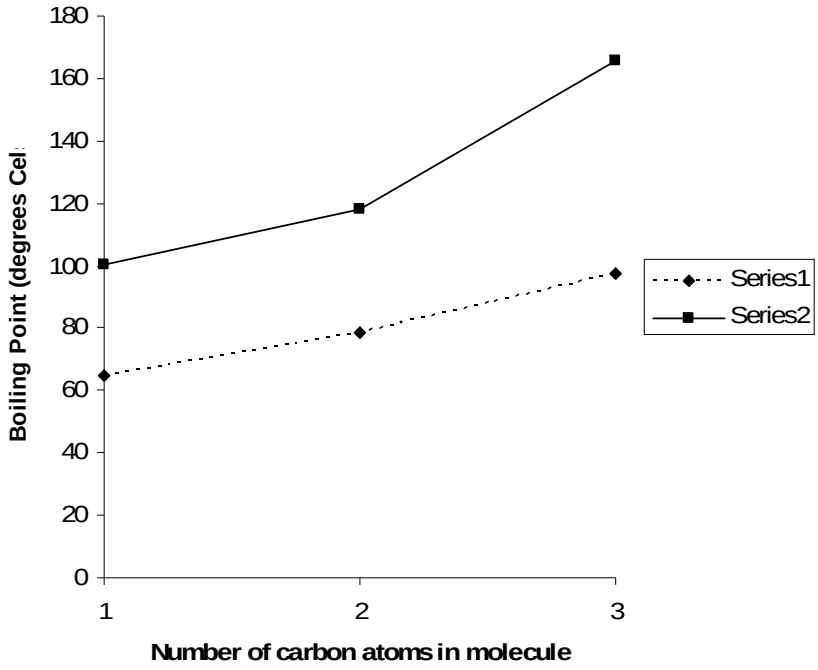
Part B Free Response Questions - pages 7-12 (30 marks)

Attempt Questions 11 to 17. Allow about 45 minutes for this part.

- *Show all relevant working in questions involving calculations.*

Question 11 (4 marks)

The following graphs describe the boiling points of alkanoic acids (Series 2) and alkanols (Series 1). Explain two trends in these graphs.



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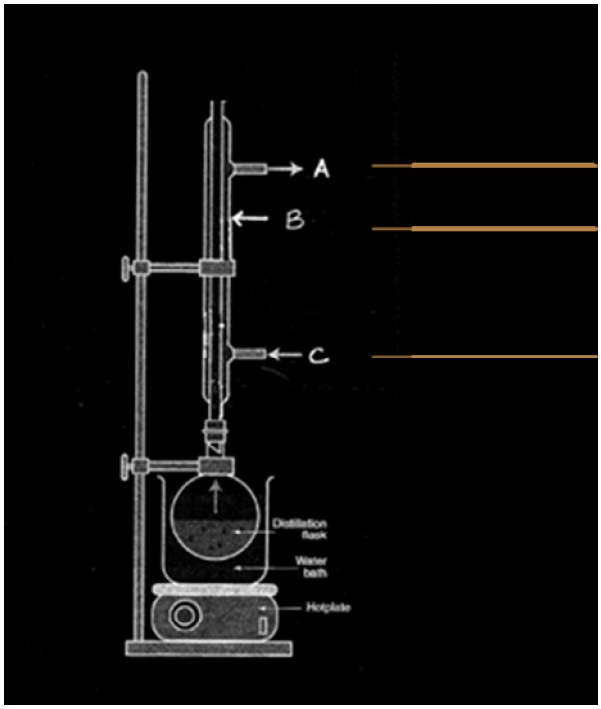
Question 12 (6 marks)

Esters tend to have strong flavours and odours and are used in perfumes, cosmetics and processed foods.

(a) Label the apparatus and processes used in the preparation of ethyl butanoate. (3 marks)



(b) Identify the two organic reactants . (1 mark)

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(c) Explain the need for refluxing during esterification. (2 marks)

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Question 13 (5 marks)

(a) Complete the following table by identifying the salts as acidic, basic or neutral.(3 marks)

salt	*acidic, basic or neutral*
Ammonium chloride	
Sodium carbonate	
Calcium nitrate	
Potassium acetate	
Sodium chloride	
Potassium hydrogen carbonate	

(b) Write a net ionic equation to show the behaviour of the acetate ion in water. (1 mark)

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(c) Identify a conjugate acid/base pair in (b). (1 mark)

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Question 14 (4 marks)

Describe one example of combustion reactions, where the same reactants form different products under different conditions. Identify these conditions and include balanced chemical equations to support your answer.

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Question 15 (2 marks)

(a) Identify one industrial use of ammonia (1 mark)

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(b) Describe one reason for the close monitoring of the gas stream entering the reaction vessel in the industrial synthesis of ammonia. (1 mark)

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Question 16 (5 marks)

Acidic oxides have increased in concentration in the atmosphere since the 1800s. There have been some major concerns about these increases over the last 50 years.

(a) Use a series of relevant balanced chemical equations to show the production of acid rain from industrial sources involving sulfur. (2 marks)

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(b) Discuss the evidence for the concern of the increase in acid rain. (3 marks)

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Question 17 (4 marks)

Describe how commercial radioisotopes and transuranic elements are produced using specific examples of each.

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🔔 *END of Theory Test*