

Section A Multiple Choice (1 mark each)

1. A prac test requires students to devise a method to distinguish 0.1 mol L^{-1} nitric and acetic acids. A student thinks about the following possibilities...

- (i) *Titrate equal volumes of each acid with a strong base using appropriate indicators.*
- (ii) *Test the pH of the solutions.*
- (iii) *Test the electrical conductivity of the solutions.*

Which method(s) is/are invalid?

- (A) (i) only
- (B) (ii) only
- (C) (iii) only
- (D) (i) and (iii) only

2. 100 mL of a $2.5 \times 10^{-3} \text{ mol L}^{-1}$ sample of a strong monoprotic acid is diluted by the addition of 500 mL of water. What is the change in pH?

- (A) decreases by 0.70 pH units
- (B) increases to pH 3.30
- (C) decreases by 0.78 pH units
- (D) increases to pH 3.38

3. When a student conducts a titration, the burette should be:

- (A) rinsed with distilled water only
- (B) only used when completely dry
- (C) rinsed with the solution to be delivered
- (D) rinsed with a trace of an indicator

4. The compound $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$ is a component of pineapple fragrance. The name of the compound is

- (A) propyl ethanoate
- (B) butyl methanoate
- (C) methyl propanoate
- (D) methyl butanoate

Answer Booklet for Sections A and B**Student No.....****INSTRUCTIONS**

Use the multiple choice answer sheet below.

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

Sample $2+4=$ (A) 2 (B) 6 (C) 8 (D) 9A ☐ 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 this by writing the word *correct* and drawing an arrow as follows:

~~A ☐~~ ~~B ☐~~ C ☐ D ☐

correct →

Section A**Multiple Choice Answer Sheet**

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|----|-------------------------|-------------------------|-------------------------|-------------------------|
| 1. | A <input type="radio"/> | B <input type="radio"/> | C <input type="radio"/> | D <input type="radio"/> |
| 2. | A <input type="radio"/> | B <input type="radio"/> | C <input type="radio"/> | D <input type="radio"/> |
| 3. | A <input type="radio"/> | B <input type="radio"/> | C <input type="radio"/> | D <input type="radio"/> |
| 4. | A <input type="radio"/> | B <input type="radio"/> | C <input type="radio"/> | D <input type="radio"/> |

Section B. Short Answer Questions (Nos 5-11)

MARK(S)

Question 5 (1 mark)

Describe the purpose of using acid as a catalyst for esterification .

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Question 6 (2 marks)

Name an acidic salt and give an equation to show the reaction of this acidic salt in water .

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Question 7. (3 marks)

In a titration, 25.00mL of barium hydroxide solution is neutralised by 24.95 mL of a 0.0500 mol L⁻¹ solution of hydrochloric acid. What is the concentration of the barium hydroxide solution?

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Question 8 (5 marks)

- (a) Ammonia ranks second to sulfuric acid in terms of annual worldwide production.. Identify *one* industrial use of ammonia.

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- (b) Describe the conditions under which Haber developed the industrial synthesis of ammonia and evaluate its significance at that time in world history.

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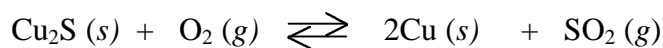
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Question 9 (4 marks)**MARK(S)**

Last year, the Japanese-owned PKC copper smelter located in Port Kembla was prosecuted by the EPA for air pollution. The company was fined \$150,000 and forced to fit \$6,000,000 of anti-pollution gear to the smelter.

Copper smelting involves extraction of copper metal from sulfide ores...



- (a) Calculate the volume of sulfur dioxide produced
(at 25 °C and 100 kPa) when one tonne of copper is extracted. **2**

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- (b) Write an equation to show how sulfur dioxide emissions produce s
acid rain and name the acid produced. **2**

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- (c) Describe a harmful effect of rain polluted by the smelter's
operation. **1**

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Question 10 (6 marks)

MARK(S)

- (a) Explain why chemists classify acetic acid as a weak acid, while hydrochloric acid is regarded as a strong acid. Include equations to support your answer.

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- (b) The pH of 0.020 mol L^{-1} acetic acid is 3.32. Calculate the pH of 0.020 mol L^{-1} HCl.

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- (c) Select the indicator from the table which could be used to identify 0.020 mol L^{-1} solutions of the two acids. (Hydrochloric and acetic acids) **1**

Indicator	pH range	Colour (low pH – high pH)
Manzate	1.6 – 3.3	red – yellow
Norphen	1.2 – 2.8	yellow-blue
Orsin	2.4 – 4.0	yellow – red
Phentanyl	3.3 – 5.2	green – violet

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Question 10 continues next page

- (d) State the resultant colours (**use single words**) of the HCl and CH₃COOH solutions after the indicator was added.

MARK(S)

1

Acid	Colour
Hydrochloric acid	
Acetic acid	

Question 11

Radioisotopes are of immense importance for diverse uses in medicine and industry.

- (a) Describe how commercial radioisotopes are produced.

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- (b) Identify one named radioisotope and describe its use in medicine **or** industry

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END of TEST 