



CATHOLIC SECONDARY SCHOOLS
ASSOCIATION OF NEW SOUTH WALES

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Centre Number

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Student Number

2008
TRIAL HIGHER SCHOOL CERTIFICATE
EXAMINATION

Chemistry

Morning Session
Thursday, 7 August 2008

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen
- Draw diagrams using pencil
- Board-approved calculators may be used
- Use the Data Sheet and Periodic Table provided
- Use the Multiple Choice Answer Sheet provided
- Write your Centre Number and Student Number at the top of this page and page 9

Total marks – 100

Section I

Pages 2–24

75 marks

This section has two parts, Part A and Part B

Part A – 15 marks

- Attempt Questions 1–15
- Allow about 30 minutes for this part

Part B – 60 marks

- Attempt Questions 16–30
- Allow about 1 hour and 45 minutes for this part

Section II

Pages 25–35

25 marks

- Attempt ONE question from Questions 31–35
- Allow about 45 minutes for this section

Disclaimer

Every effort has been made to prepare these 'Trial' Higher School Certificate Examinations in accordance with the Board of Studies documents, *Principles for Setting HSC Examinations in a Standards-Referenced Framework* (BOS Bulletin, Vol 8, No 9, Nov/Dec 1999), and *Principles for Developing Marking Guidelines for Examinations in a Standards Referenced Framework* (BOS Bulletin, Vol 9, No 3, May 2000). No guarantee or warranty is made or implied that the 'Trial' Examination papers mirror in every respect the actual HSC Examination question paper in any or all courses to be examined. These papers do not constitute 'advice' nor can they be construed as authoritative interpretations of Board of Studies intentions. The CSSA accepts no liability for any reliance, use or purpose related to these 'Trial' question papers. Advice on HSC examination issues is only to be obtained from the NSW Board of Studies.

3501-1

Section I
75 marks

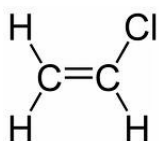
Part A – 15 marks

Attempt Questions 1-15

Allow about 30 minutes for this part

Use the Multiple Choice Answer Sheet provided.

- 1** Which of the following correctly identifies this monomer?



	<i>Systematic name</i>	<i>Common name</i>
(A)	chloroethene	vinyl chloride
(B)	styrene	chloroethene
(C)	chloroethene	styrene
(D)	vinyl chloride	chloroethene

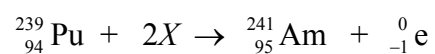
- 2** The following table gives the heats of combustion of three liquid alkanols in kJ/g.

<i>Alkanol</i>	<i>Heat of combustion (kJ/g)</i>
methanol	22.7
ethanol	29.7
1-butanol	36.1

Which of the following is the best approximation for the molar heat of combustion of 1-propanol?

	<i>Molar heat of combustion (kJ/mol)</i>
(A)	34
(B)	43
(C)	2000
(D)	3200

- 3 Most of the world's ethylene is currently produced from the
- (A) dehydration of ethanol.
 - (B) fermentation of sugars.
 - (C) treatment of biomass.
 - (D) cracking of crude oil.
- 4 Which part of a galvanic cell is responsible for maintaining electrical neutrality?
- (A) The anode
 - (B) The cathode
 - (C) The electrolyte solution surrounding the electrodes
 - (D) The electrolyte solution in the salt bridge
- 5 Americium-241 is produced according to the reaction



What is the identity of X ?

- (A) A neutron
- (B) A proton
- (C) A beta particle
- (D) An alpha particle

- 6 An unknown chemical was removed from the surface of a food storage cupboard being checked for contamination. One of the first tests performed by the chemist was to determine the pH of the chemical by using indicators.

The results are shown in the table below.

<i>Indicator</i>	<i>Colour</i>
Phenolphthalein	Colourless
Methyl orange	Yellow
Bromothymol blue	Yellow

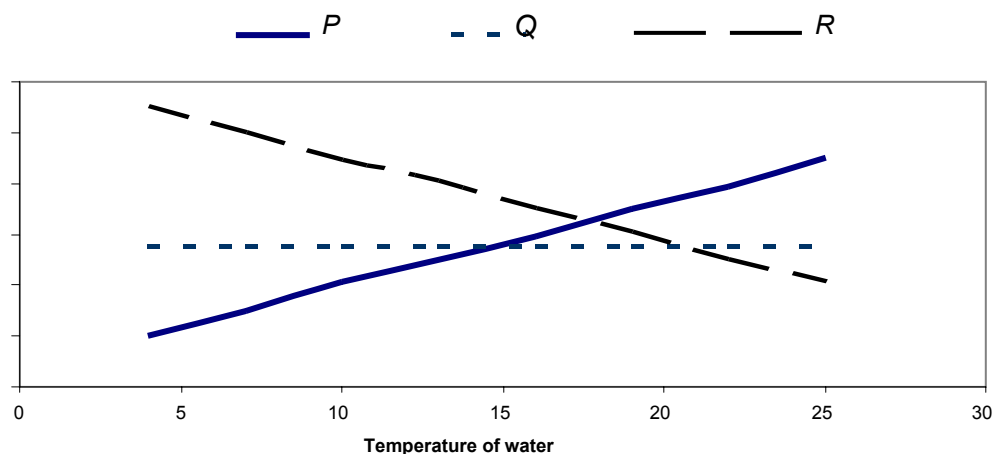
How should the chemist classify the chemical?

- (A) Strongly acidic
- (B) Slightly acidic
- (C) Neutral
- (D) Slightly alkaline
- 7 The conjugate base of HNO_2 is
- (A) OH^-
- (B) NO_2^-
- (C) NO_3^-
- (D) H_3O^+
- 8 Which action would result in an increase of TWO pH units of the solution?
- (A) Diluting 10 mL of $0.01 \text{ mol L}^{-1} \text{ HCl (aq)}$ to 40 mL
- (B) Diluting 10 mL of $0.01 \text{ mol L}^{-1} \text{ NaOH (aq)}$ to 40 mL
- (C) Diluting 10 mL of $0.01 \text{ mol L}^{-1} \text{ HCl (aq)}$ to 1000 mL
- (D) Diluting 10 mL of $0.01 \text{ mol L}^{-1} \text{ NaOH (aq)}$ to 1000 mL

- 9 A naturally occurring, moderately weak, triprotic acid is represented by the formula
- (A) $\text{C}_6\text{H}_8\text{O}_7$
 - (B) $\text{CH}_3(\text{CH}_2)_6\text{COOH}$
 - (C) CH_3COOH
 - (D) H_3O^+
- 10 During the esterification process, a reflux system is often set up. The refluxing
- (A) allows the reaction to proceed at a lower temperature.
 - (B) prevents the very volatile concentrated sulfuric acid from evaporating.
 - (C) allows the reactants to react efficiently at a higher temperature.
 - (D) prevents the alcohol from boiling in the flask.

- 11 A river that begins at the foot of a glacier was tested for water quality at several places along its course as the water moves downstream through uninhabited forest reserve. The temperature of the water increases as the water moves downstream. THREE different tests (labelled *P*, *Q* and *R* in the graph's legend) were conducted at EACH location.

The data plotted to represent the results of the three tests (*P*, *Q* and *R*) is shown below.



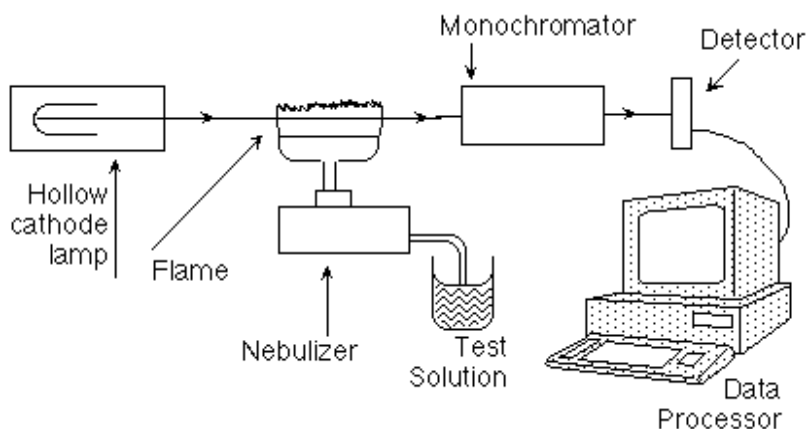
Identify the THREE tests carried out.

	<i>Test P</i>	<i>Test Q</i>	<i>Test R</i>
(A)	Total dissolved solids	Acidity	Dissolved oxygen
(B)	Turbidity	Total dissolved solids	Hardness
(C)	Acidity	Hardness	Turbidity
(D)	Dissolved oxygen	Turbidity	Total dissolved solids

- 12 Which of the following species does not contain a co-ordinate covalent bond?

- (A) O_3
- (B) CO
- (C) NH_4^+
- (D) CH_4

- 13 The diagram below shows an Atomic Absorption Spectrometer being used to test for the presence of lead.



<http://www.chemistry.nmsu.edu/Instrumentation/AAS1.html>

- If the test solution contains lead, then the light picked up by the detector will be at a
- (A) higher intensity than the light produced by the hollow cathode lamp.
 - (B) lower intensity than the light produced by the hollow cathode lamp.
 - (C) higher frequency than the light produced by the hollow cathode lamp.
 - (D) lower frequency than the light produced by the hollow cathode lamp.
- 14 In the Haber process, which of the following conditions would result in the most industrially efficient method of increasing the yield of ammonia?
- (A) Increasing the temperature of the reaction vessel
 - (B) Increasing the amount of $\text{N}_2(g)$
 - (C) Increasing the amount of $\text{H}_2(g)$
 - (D) Removing the $\text{NH}_3(g)$ as it forms

- 15 A student was given a pure sample of an unknown salt and asked to determine the cation and anion present. She carried out the following reactions.

	<i>Method</i>	<i>Result</i>
Test 1	Dilute nitric acid was added to a portion of the sample.	Bubbles of gas were observed. The solid sample dissolved, forming a solution. No precipitate formed.
Test 2	Dilute hydrochloric acid was added to another portion of the sample.	Bubbles of gas were observed. The solid sample dissolved, forming a solution. No precipitate formed.
Test 3	Dilute sulfuric acid was added to another portion of the sample.	Bubbles of gas were observed. The solid sample dissolved, forming a solution. No precipitate formed.
Test 4	Excess sodium hydroxide solution was added to the solution resulting from Test 1.	A white precipitate formed which turned brown on standing.
Test 5	A flame test was carried out on a fresh portion of the sample.	No distinctive flame colour was observed.

The student's results are consistent with the unknown salt being

- (A) calcium carbonate.
- (B) calcium nitrate.
- (C) iron (II) carbonate.
- (D) iron (II) nitrate.