Centre Number

Student Number

CATHOLIC SECONDARY SCHOOLS
ASSOCIATION OF NEW SOUTH WALES

2006
TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Chemistry

Afternoon Session
Friday 4 August 2006

Total marks – 100

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using blue or black 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 on page 9

Section I Pages 3-21

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 16-29
- Allow about 1 hour and 45 minutes for this part

Section II Pages 25-34

25 marks
- Attempt ONE question from Questions 30-34
- Allow about 45 minutes for this section

EXAMINERS

Bronwen Hegarty (convenor)	Educational Consultant
Dallas Demeny	Ravenswood School, Gordon
Jo McGrouther	St. Vincent's College, Potts Point
Troy McMurrich	Oakhill College, Castle Hill
Mark Shore	Queenwood School, Mosman
Alan Wilson	Caroline Chisholm College, Glenmore Park

Source
Question 28 – http://www.csiro.au/files/mediaRelease/mr1999/Ozone.htm

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 Why can ethylene be transformed readily into other compounds?

(A) It is a product of both fossil fuels and biomass.

(B) It has a highly reactive double bond.

(C) It easily loses two H atoms.

(D) It can be catalytically cracked to form many different alkanes.

2 $n\ (HO\text{-}C_6H_{10}O_4\text{-}OH) \rightarrow H\text{-}(O\text{-}C_6H_{10}O_4)_n\text{-}OH + (n\text{-}1)\ H_2O$

What type of reaction is this?

(A) catalytic cracking

(B) condensation polymerisation

(C) addition polymerisation

(D) oxidation and reduction

3 A student was investigating the heat of combustion of ethanol. She used an ethanol burner that had an initial mass of 68.0 g. She then lit the burner and placed it under a beaker containing 500 mL of water. After a few minutes, she noticed that the water temperature had risen from 24°C to 38°C and the burner now weighed 66.5 g.

She made the assumption that only the water was heated.

What would be the student's value for the heat of combustion for ethanol?

(A) 87.8 J mol^{-1}

(B) 29.3 kJ mol^{-1}

(C) 899 kJ mol^{-1}

(D) 1350 kJ mol^{-1}

4 Consider the following reaction involving hydrogen ions.

$$2Na(s) + 2H^{+}(aq) \rightarrow H_2(g) + 2Na^{+}(aq)$$

Which statement about the hydrogen ions in this reaction is correct?

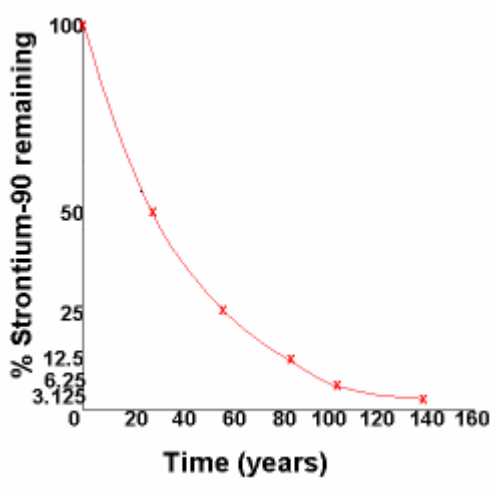
(A) They undergo an increase in oxidation state.

(B) They are classified as the oxidising agent.

(C) They lose electrons.

(D) They undergo an acid-base reaction with the sodium metal.

5 The graph shows the radioactive decay of strontium-90.



What is the approximate half-life of strontium-90?

(A) 30 years

(B) 50 years

(C) 80 years

(D) 140 years

6 An unknown chemical was extracted from a soil sample and sent to your laboratory. One of the first tests you carried out was to determine the pH of the chemical by using indicators. The following are the results:

Indicator	Colour
Phenolphthalein	Colourless
Methyl orange	Yellow
Bromothymol blue	Blue

How should your laboratory classify the soil sample?

(A) strongly acidic

(B) slightly acidic

(C) neutral

(D) slightly alkaline

7 The pH of a 0.1 mol L^{-1} solution of a monoprotic acid was measured by a student and found to be close to 3. What proportion of the acid molecules remains unconverted to ions?

(A) 0 %

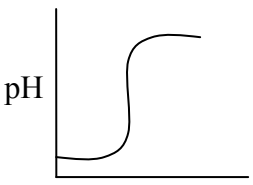
(B) 1 %

(C) 60 %

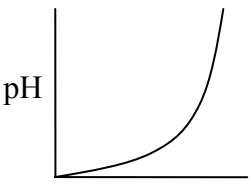
(D) 99 %

8 Which of the following curves would represent the change in pH in a conical flask when a solution of hydrochloric acid (from a burette) is added to a solution of sodium hydroxide (in the conical flask)?

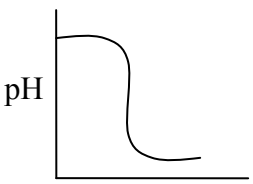
(A)



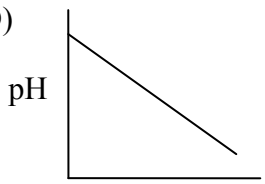
(B)



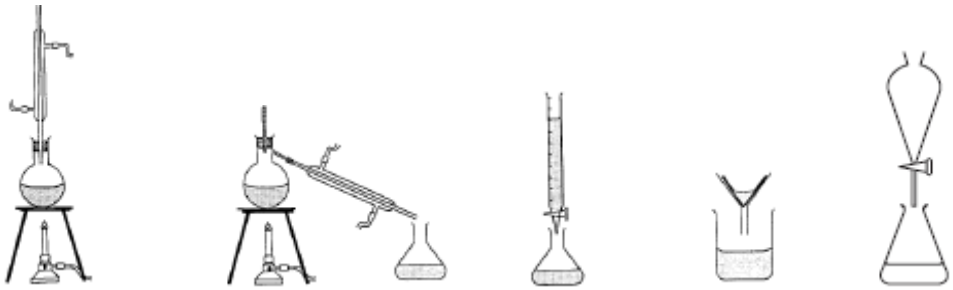
(C)



(D)



9 The following diagrams show equipment you have used in carrying out first-hand investigations in the school laboratory.



P Q R S T

Students were asked to perform an experiment in 3 steps:

Step1: The ester, ethyl propanoate, was prepared from ethanol, propanoic acid and a small amount of concentrated sulfuric acid.
Step 2: An impure sample of the ester was then separated from any unreacted acid, alcohol and sulfuric acid.
Step 3: A pure sample of the ester was collected.

The equipment used in each step of this experiment was:

	Step 1	Step 2	Step 3
(A)	P	T	Q
(B)	P	Q	S
(C)	Q	R	T
(D)	Q	T	S

10 Calculate the mass of carbon dioxide formed when 74.4 L of oxygen gas at 100 kPa and 25 ^{o}C completely combusts a sample of ethanol.

(A) 44 g
(B) 50 g
(C) 88 g
(D) 132 g

11 Identify the catalyst used in the Haber process.

(A) a zeolite
(B) concentrated sulfuric acid
(C) dilute sulfuric acid
(D) iron oxide

12 Identify the ion present in an unknown solution that produces bubbles with the addition of dilute nitric acid.

(A) Cl^-

(B) CO_3^{2-}

(C) PO_4^{3-}

(D) SO_4^{2-}

13 The three equations below summarise a series of reactions occurring in the atmosphere.

$CCl_3F + \text{UV radiation} \rightarrow Cl\bullet + \bullet CCl_2F$

$Cl\bullet + O_3 \rightarrow \bullet ClO + O_2$

$\bullet ClO + O \rightarrow Cl\bullet + O_2$

What do these three equations explain?

(A) Production of oxygen gas in the troposphere.

(B) Formation of ozone in the stratosphere.

(C) Absorption, by ozone, of harmful UV radiation.

(D) Production, destruction and regeneration of chlorine atoms.

14 $CHCl_2CF_3$ and $CHClFCClF_2$ are

(A) isomers

(B) isotopes

(C) allotropes

(D) CFCs

15 The treatment of water to make it suitable for human consumption is a process which occurs in steps.

Identify the INCORRECT statement relating to this process.

(A) The pH of the water is increased by the addition of lime or sodium hydroxide to assist in coagulation.

(B) Salts such as alum or iron (III) chloride are added to bring about coagulation and sedimentation of suspended materials.

(C) Chloride ions are added to kill bacteria in the water.

(C) Fluoride salts may be added to assist in the prevention of tooth decay in children.

BLANK PAGE