



RIVER VALLEY HIGH SCHOOL

YEAR 6 PRELIMINARY EXAMINATION II

CANDIDATE
NAME

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CLASS

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CENTRE
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H1 CHEMISTRY

8872/01

Paper 1 Multiple Choice

21 Sep 2017

50 mins

Additional Materials: Multiple Choice Answer Sheet
Data Booklet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and index number on the Optical Answer Sheet in the spaces provided.

There are **thirty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the one you consider correct and record your choice in **soft pencil** on the Optical Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

This document consists of **14** printed pages.

1 *Use of the Data Booklet is relevant to this question.*

What is the percentage, by volume, of carbon dioxide in the air sample?

- A** 0.30% **B** 0.57%
- C** 0.60% **D** 1.20%

- What is the formula of the organic compound?

- A** C_3H_8 **B** C_4H_8
C C_4H_{10} **D** C_6H_6

- Assuming the reaction goes to completion, how many moles of $\text{Tl}^+(\text{aq})$ and $\text{VO}_3^-(\text{aq})$ would result in a mixture containing equal number of moles of $\text{VO}_3^-(\text{aq})$ and $\text{V}^{2+}(\text{aq})$ once the reaction had taken place?

	Moles of $Tl^+(aq)$	Moles of $VO_3^-(aq)$
A	1	2
B	1	3
C	2	3
D	3	4

-



River Valley High School
2017 Preliminary Examinations II

- 6 Elements **X** and **Y** have the following successive ionisation energies in kJ mol^{-1} .

	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
X	580	1800	2700	11600	14800	18400	23300
Y	1310	3400	5300	7500	11000	13300	20300

What could be the formula of the compound formed by these two elements?

- A** XY_3 **B** X_2Y_3 **C** X_3Y_2 **D** X_4Y_3

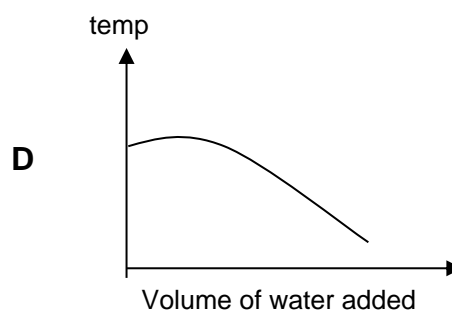
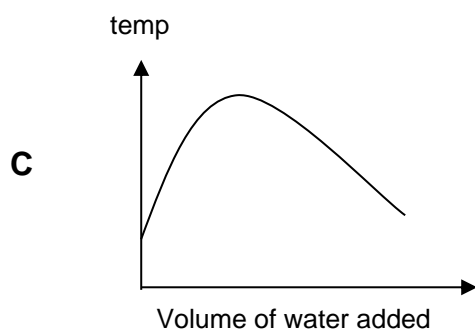
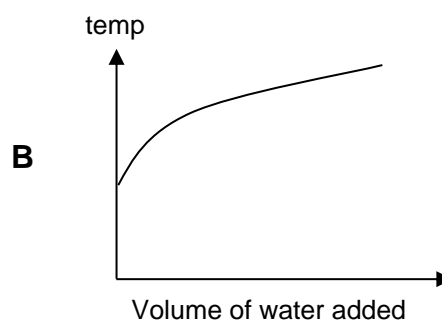
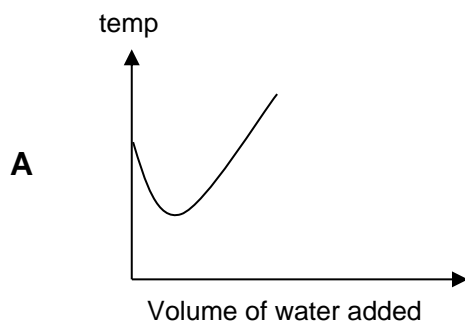
- 7 Which pair of compounds meets the criteria below?

- The first compound has a larger bond angle than the second compound.
- The second compound is more polar than the first compound.

- A** $\text{CO}_2, \text{BCl}_3$ **B** $\text{IClF}_2, \text{ClO}_2$ **C** HCN, SO_3 **D** $\text{CO}_2, \text{NCl}_3$

- 8 When water is stirred with glucose, strong hydrogen bonds are initially formed between glucose molecules and water molecules, but as more water is added, these hydrogen bonds are broken.

Which graph best represents the observed temperature changes?



- 9 Use of the Data Booklet is relevant to this question.

A student dissolved 8.4 g of sodium fluoride in 250 g of water.

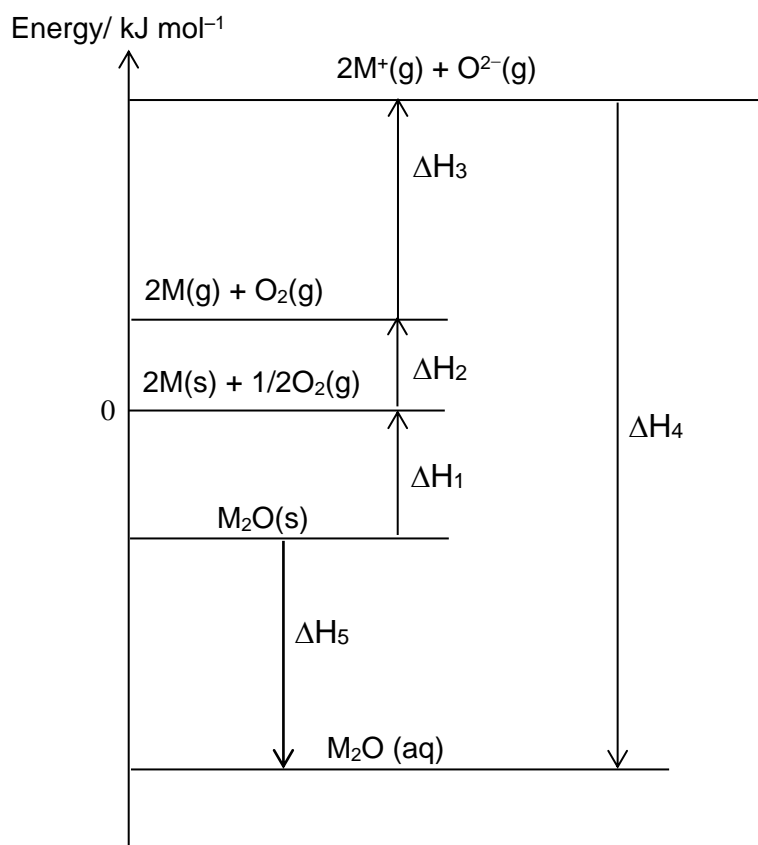
The enthalpy change of reaction is $+71 \text{ kJ mol}^{-1}$.

What would be the initial temperature of the water if the final temperature of the solution is 20.00°C ?

Assume that the specific heat capacity of sodium fluoride solution is $4.2 \text{ J g}^{-1} \text{ K}^{-1}$.

- A** 6.48°C **B** 33.08°C **C** 33.52°C **D** 47.62°C

- 10 An energy cycle involving a metal oxide, M_2O , is shown below.



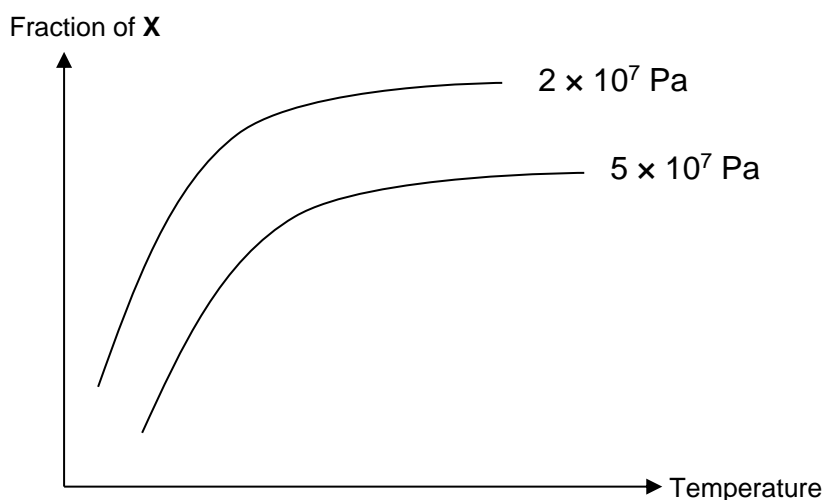
Which expression represents the enthalpy change of formation of $\text{M}_2\text{O}(\text{s})$?

- A** ΔH_1
B $\Delta H_4 - \Delta H_5$
C $\Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4$
D $\Delta H_2 + \Delta H_3 + \Delta H_4 - \Delta H_5$

- 11 For which of the following reactions does the enthalpy value represent **both** a standard enthalpy change of combustion **and** a standard enthalpy change of formation?

- A $\text{CO(g)} + \frac{1}{2}\text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)}$
 B $2\text{C(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{CO(g)}$
 C $\text{C(s)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)}$
 D $\text{C(s)} + 2\text{O(g)} \rightarrow \text{CO}_2\text{(g)}$

- 12 The graph below shows how the fraction of a substance, **X**, in an equilibrium mixture varies with temperature at pressures of 2×10^7 Pa and 5×10^7 Pa.



Which underlined compound represents **X**?

- A $2\text{N}_2\text{(g)} + 6\text{H}_2\text{O(g)} \rightleftharpoons 4\text{NH}_3\text{(g)} + 3\text{O}_2\text{(g)} \quad \Delta H = +1267 \text{ kJ mol}^{-1}$
 B $\text{C(s)} + \text{H}_2\text{O(g)} \rightleftharpoons \text{H}_2\text{(g)} + \text{CO(g)} \quad \Delta H = +131 \text{ kJ mol}^{-1}$
 C $2\text{SO}_2\text{(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{SO}_3\text{(g)} \quad \Delta H = -197 \text{ kJ mol}^{-1}$
 D $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)} \quad \Delta H = -92 \text{ kJ mol}^{-1}$

- 13 Nitrogen dioxide decomposes on heating according to the following equation.



When 4 moles of nitrogen dioxide was put into a 1 dm³ container and heated, the equilibrium mixture contained 0.8 moles of oxygen. What is the numerical value of the equilibrium constant, K_c , at the temperature of the experiment?

- A $\frac{0.8 \times 0.8}{2.4}$
- B $\frac{0.8^2 \times 0.8}{4^2}$
- C $\frac{1.6 \times 0.8}{2.4^2}$
- D $\frac{1.6^2 \times 0.8}{2.4^2}$

- 14 Which combination of substances would give a buffer solution?

- A 2 mol of NaOH and 1 mol of CH₃CO₂H
- B 2 mol of CH₃CO₂H and 1 mol of NaOH
- C 1 mol of HCl and 1 mol of CH₃CO₂Na
- D 2 mol of NH₃ and 1 mol of CH₃CO₂Na

- 15 What is the final pH of the solution formed when two equal volumes of HCl solutions, one with pH 1.0 and the other with pH 3.0 are mixed?

- A 1.0 B 1.3 C 2.0 D 2.5

- 16** The kinetics of the reaction between iodide and peroxodisulfate can be investigated by varying the volume of the reactants used. The two reactants are mixed in the presence of a known amount of $\text{Na}_2\text{S}_2\text{O}_3$ and a little starch. The time taken for an intense blue colour to be observed is then determined.

Experiment	Volume used/ cm^3			t/s
	1.0 mol dm^{-3} KI	$0.040 \text{ mol dm}^{-3}$ $\text{Na}_2\text{S}_2\text{O}_8$	H_2O	
1	10.0	5.0	25.0	170
2	15.0	5.0	20.0	113
3	15.0	10.0	15.0	57
4	20.0	20.0	0.0	x

What is the value of x?

- A** 21 **B** 28 **C** 85 **D** 63

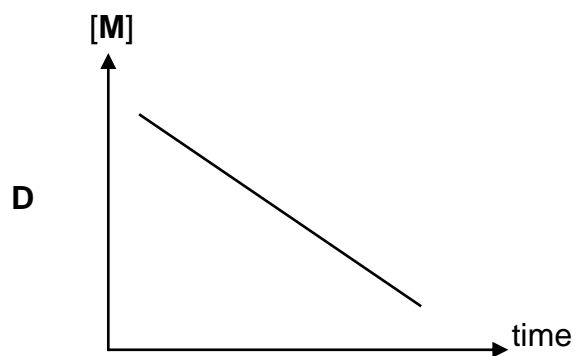
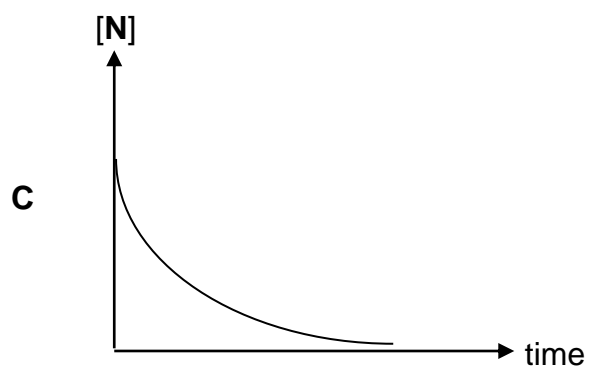
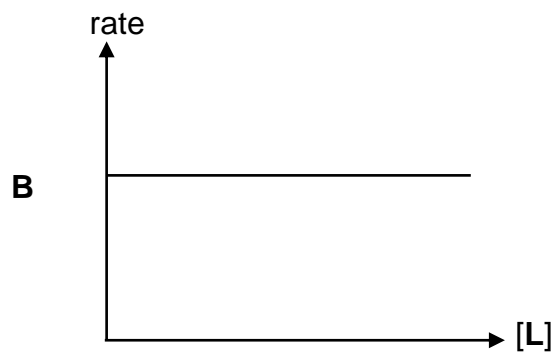
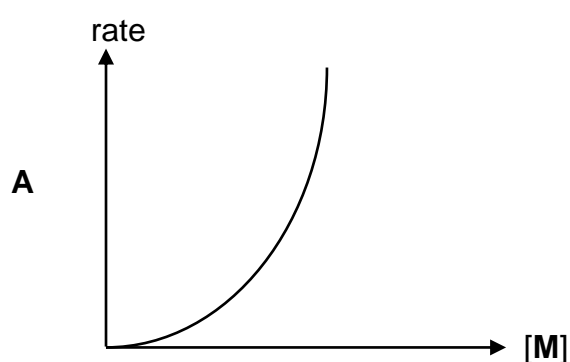
- 17** Which one of the following is a correct statement about the effect of a catalyst?
- A** It provides an alternative route with a lower activation energy for a reaction.
- B** It increases the equilibrium constant for a forward reaction.
- C** It increases the yield of product in equilibrium.
- D** It increases the rate of the forward reaction only.

18 L, M and N react to form P and Q as shown.



The rate equation for this reaction is $\text{rate} = k[\text{M}][\text{N}]$.

Which of the following graphs is correct of the above reaction, when N is in excess?



19 Which one of the following best describes the compounds formed by aluminium?

	Oxide	Chloride
A	Basic	basic
B	Amphoteric	neutral
C	Amphoteric	acidic
D	Basic	acidic

- 20 The chloride of the following elements are dissolved in water. The chloride of element which produces the solution with the greatest pH is

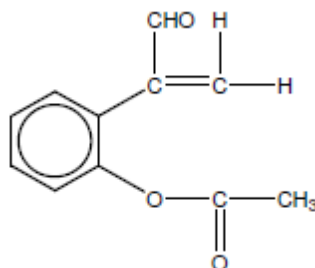
A Al
B Na
C Mg
D P

- 21 Alkynes are a series of non-cyclic hydrocarbons with the general formula, C_nH_{2n-2} containing one carbon-carbon triple bond per molecule.

How many alkynes with 6 carbon atoms satisfies the above formula?

A 5
B 6
C 7
D 8

22

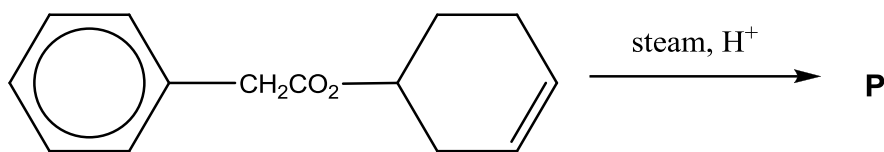


Compound A

Which reagent will not react with compound **A**?

A alkaline I_2 (aq)
B alkaline Cu^{2+} ions
C $LiAlH_4$ in dry ether
D cold alkaline $KMnO_4$

23 The diagram shows a reaction.



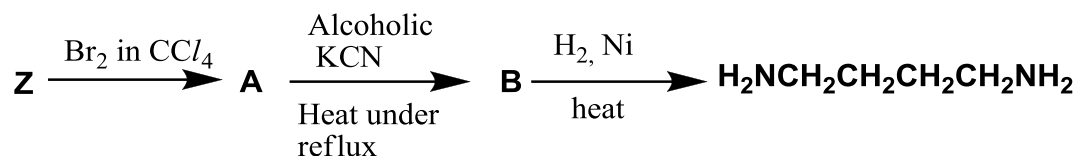
What could be the final products, **P**?

- | | | |
|----------|--|--|
| A | | |
| B | | |
| C | | |
| D | | |

24 Which of the following statements is **false** in the reaction of C_2H_6 with Br_2 ?

- A** Steamy fumes are produced in the reaction.
- B** A mixture of brominated alkanes is formed.
- C** High temperature can be used in place of UV light.
- D** The intermediate formed is highly reactive as it has a lone pair of electrons.

- 25 An organic compound **Z** underwent the following successive reactions.



Which of the following compounds is **Z** likely to be?

- A** $\text{CH}_2=\text{CH}_2$
B $\text{C}/\text{CH}=\text{CHC}/$
C $\text{CH}_3\text{CH}=\text{CHCH}_3$
D $\text{CH}_2=\text{CHCH}=\text{CH}_2$

Section B

For each of the questions in this section, one or more of the three numbered statements **1** to **3** may be correct.

Decide whether each of the statements is or is not correct (you may find it helpful to put a tick against the statements that you consider to be correct).

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

No other combination of statements is used as a correct response.

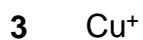
- 26 Which of the following statements about the carbonate ion, CO_3^{2-} , are correct?

- 1** The carbon atom is the central atom.
2 The carbon in CO_3^- has an octet electronic configuration.
3 It has the same bond angle as the nitrate ion, NO_3^- .

27 Use of the Data Booklet is relevant to this question.

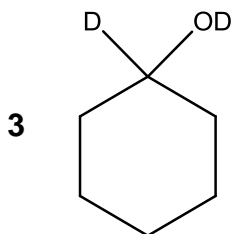
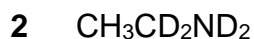
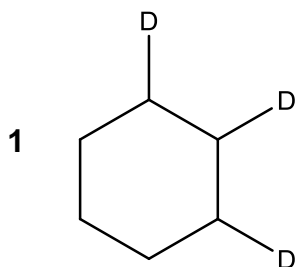
Species containing one or more unpaired electrons are said to be paramagnetic as they can be attracted by an external magnetic field.

Which of the following species are paramagnetic?



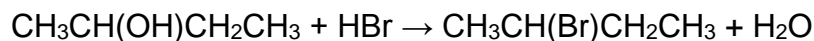
28 Deuterium is an isotope of hydrogen, ${}^2_1\text{H}$.

Which compound can be formed by the addition of D_2 to another molecule, in the presence of platinum catalyst?



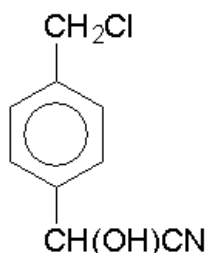
- 29** During the preparation of many organic compounds, by-products are formed. This usually occurs because the reagents can react in more than one way, depending on the conditions used, or because the products formed may react with the reactants.

2-bromobutane may be prepared by slowly adding concentrated sulfuric acid to sodium bromide to form hydrogen bromide which reacts with butan-2-ol. The reaction mixture is kept cool to optimise the reaction yield.



What could be a by-product of this reaction if the temperature is allowed to rise?

- 1 $\text{CH}_2=\text{CHCH}_2\text{CH}_3$
 - 2 $\text{CH}_2\text{BrCH}_2\text{CH}_2\text{CH}_3$
 - 3 $\text{CH}_3\text{CBr}_2\text{CH}_2\text{CH}_3$
- 30** A newly-discovered drug that is claimed to cure AIDS contains an active ingredient of the following structure:



Which of the following statements concerning its properties are **correct**?

- 1 It gives a white precipitate with silver nitrate after heating with aqueous sodium hydroxide.
- 2 It gives a white precipitate with aqueous bromine.
- 3 It gives a pale yellow precipitate with alkaline aqueous iodine.

Answers to Paper 1

1	C	11	C	21	C
2	B	12	B	22	A
3	D	13	D	23	A
4	B	14	B	24	D
5	A	15	B	25	A
6	B	16	A	26	A
7	D	17	A	27	B
8	C	18	B	28	C
9	C	19	C	29	B
10	D	20	C	30	D