**NATIONAL JUNIOR COLLEGE
SH1 PROMOTIONAL EXAMINATION**

Higher 1

CANDIDATE
NAMESUBJECT
CLASSREGISTRATION
NUMBER**CHEMISTRY**

Paper 1 Multiple Choice

8873/01**Monday 1 October 2018
40 minutes**

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, subject class and registration number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **20** 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 separate 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 paper consists of **9** printed pages.

Instructions on how to fill in the Optical Mark Sheet

1. Enter your NAME (as in NRIC). <u>TAN AM TECK</u> 2. Enter the SUBJECT TITLE. <u>CHEMISTRY</u> 3. Enter the TEST NAME. <u>SH1 Promo</u> 4. Enter the CLASS. <u>cm1X</u>	RUB OUT ERRORS THOROUGHLY USE PENCIL ONLY FOR ALL ENTRIES ON THIS SHEET  <table border="1"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td> </tr> <tr> <td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td> </tr> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td> </tr> <tr> <td>☐</td><td>☒</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td> </tr> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td> </tr> <tr> <td>☒</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td> </tr> </table>	0	1	2	3	4	5	6	☐	☐	☒	☐	☐	☐	☐	0	1	2	3	4	5	6	☐	☒	☐	☐	☐	☐	☐	0	1	2	3	4	5	6	☒	☐	☐	☐	☐	☐	☐
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Example:

Shade the index number in a 5 digit format on the optical mark sheet:
2nd digit and the last 4 digits of the Registration Number.

Student	Examples of Registration No.	Shade:
	<u>1805648</u>	85648

For each question there are four possible answers, **A**, **B**, **C** and **D**. Choose the **one** you consider to be correct.

- 1 The table shows the absolute abundance of a sample of naturally occurring isotopes of zinc.

	Absolute Abundance
$^{64}_{30}\text{Zn}$	100
$^{65}_{30}\text{Zn}$	80
$^{67}_{30}\text{Zn}$	20
$^{68}_{30}\text{Zn}$	10

What is the relative atomic mass of this sample of zinc?

- A** 64
B 64.9
C 68.1
D 72.2

- 2 *Use of Data Booklet is relevant to this question.*

In research on the atomic nucleus, scientists have been comparing the stability of isotopes with the same neutron : proton ratio.

Which isotope has the same neutron : proton ratio as ^{10}B ?

- A** ^{32}S **B** ^{32}P **C** ^{40}K **D** ^{40}Ar

- 3 15 cm³ of a hydrocarbon was completely combusted in 75 cm³ of oxygen. The final gaseous mixture contained 30 cm³ of carbon dioxide and 30 cm³ of unreacted oxygen. All gaseous volumes were measured under room temperature and pressure.

What is the molecular formula of the hydrocarbon?

- A** CH₄
B C₂H₄
C C₂H₆
D C₃H₆

- 4 0.0050 mol of a metal oxide, Z_2O_x , reacted exactly with 0.0060 mol of acidified potassium manganate(VII) solution.

Given that the oxidation state of **Z** in the product is +6, what is the value of *x*?

- A** 1 **B** 2 **C** 3 **D** 4

- 5 A proton and an electron both move at the same speed perpendicular to a uniform electric field.
What deflection is observed?

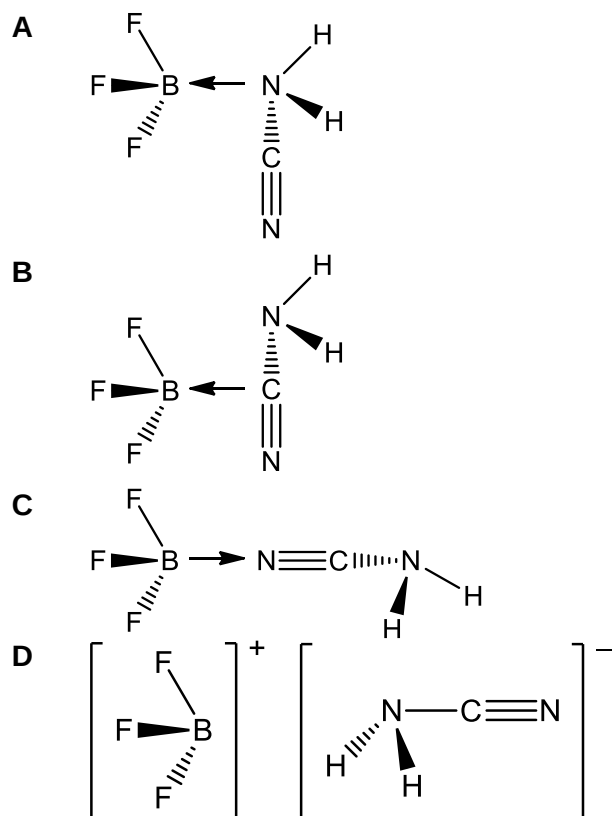
A They are deflected in opposite directions. The electron is deflected more.
B They are deflected in opposite directions. The proton is deflected more.
C They are deflected in the same direction. The electron is deflected more.
D They are deflected in the same direction. The proton is deflected more.

- 6 Which equation represents the second ionisation energy of Fe?

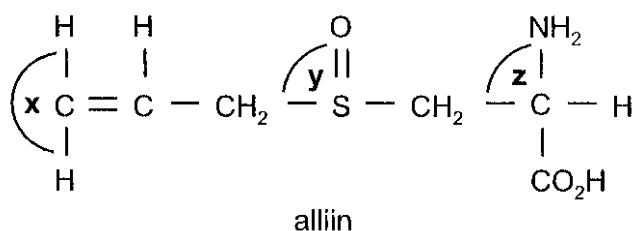
A $\text{Fe(s)} \longrightarrow \text{Fe}^{2+}(\text{s}) + 2\text{e}^{-}$
B $\text{Fe(s)} \longrightarrow \text{Fe}^{2+}(\text{g}) + 2\text{e}^{-}$
C $\text{Fe}^{+}(\text{s}) \longrightarrow \text{Fe}^{2+}(\text{s}) + \text{e}^{-}$
D $\text{Fe}^{+}(\text{g}) \longrightarrow \text{Fe}^{2+}(\text{g}) + \text{e}^{-}$

- 7 Cyanamide, NH_2CN , can react with boron trifluoride, BF_3 .

Which structure represents the product?



- 8 The characteristic smell of garlic is due to alliin. When garlic is cut, an enzyme releases alliin because alliin has the right shape to fit the enzyme molecule.



What would you expect the bond angles x, y and z to be in a molecule of alliin?

	x	y	z
A	120°	107°	109.5°
B	120°	120°	109.5°
C	180°	90°	90°
D	180°	120°	90°

- 9 Which statements about $AlCl_3$ are correct?
- 1 The aluminium atom has an incomplete octet.
 - 2 The $AlCl_3$ molecule is trigonal planar in shape.
 - 3 There are permanent dipole – permanent dipole interactions between $AlCl_3$ molecules.
- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 only **D** 2 and 3 only
- 10 Silicon dioxide, SiO_2 is a refractory material which melts at a very high temperature.

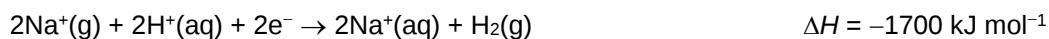
Which one of the following structures exists in SiO_2 that helps to explain the above property?

- A giant ionic lattice structure with electrostatic forces of attraction between silicon and oxygen ions.
- A simple molecular structure with covalent bonds between silicon and oxygen atoms and weak temporary dipole-induced dipole interactions between SiO_2 molecules.
- A layered structure with covalent bonds between silicon and oxygen atoms and weak temporary dipole-induced dipole interactions between the layers.
- A giant molecular structure with strong covalent bonds between silicon and oxygen atoms forming a 3 dimensional network.

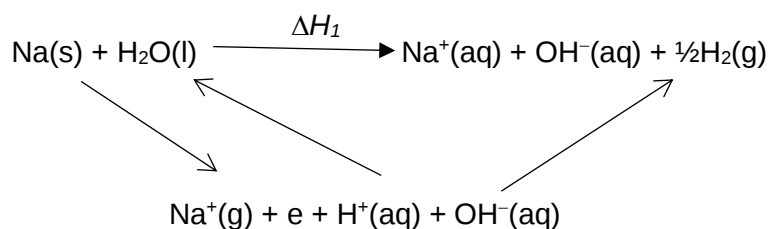
- 11** For which of the following reactions does the enthalpy value represent **both** a standard enthalpy change of combustion **and** a standard enthalpy change of formation?

- 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 enthalpy changes for three reactions are given below:



What is the enthalpy change for ΔH_1 ?



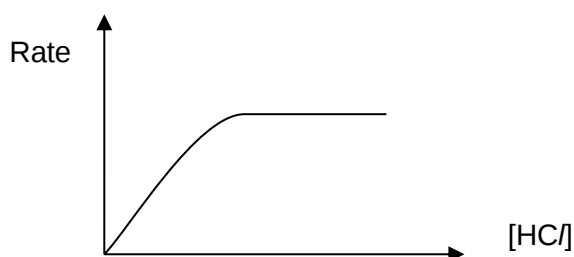
- A** -191 kJ mol^{-1} **C** -685 kJ mol^{-1}
B -307 kJ mol^{-1} **D** $-1041 \text{ kJ mol}^{-1}$

- 13** Which reactions have a positive enthalpy change of reaction?

- 1** formation of Al_2O_3 solid from gaseous Al^{3+} and O^{2-} .
2 $\text{Br}_2\text{(g)} \longrightarrow 2\text{Br(g)}$
3 $\text{Na(g)} \longrightarrow \text{Na}^+\text{(g)} + \text{e}^-$

- A** **1**, **2** and **3** are correct.
B **1** and **2** are correct.
C **2** and **3** are correct.
D Only **3** is correct.

- 14** In monitoring the reaction between sodium thiosulfate and hydrochloric acid by the initial rate method, the following graph was obtained. The initial concentration of sodium thiosulfate was the same in all experiments.



What deductions can be made from the graph?

- 1** The order of reaction with respect to hydrochloric acid at low concentrations is 1.
 - 2** The order of reaction with respect to hydrochloric acid at high concentrations is 0.
 - 3** When [sodium thiosulfate] is high, the rate is independent of [sodium thiosulfate].
- A** 1 only.
- B** 2 and 3 only.
- C** 1 and 2 only.
- D** 1, 2 and 3.
- 15** An experiment was carried out to investigate the rate of reaction between ammonium peroxodisulfate, $(\text{NH}_4)_2\text{S}_2\text{O}_8$, an oxidising agent, and potassium iodide, KI.

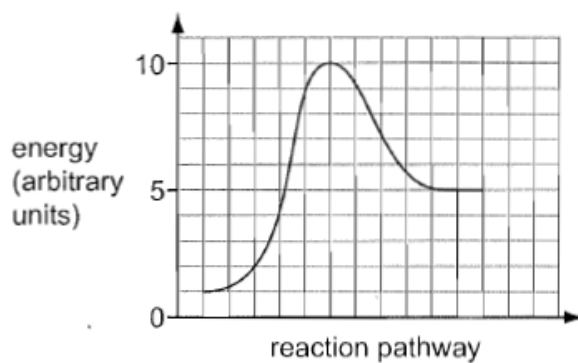
The initial concentrations of the $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and KI solutions in the mixture together with the time taken for the mixture to darken for the various experimental runs are given below.

Expt No.	$[(\text{NH}_4)_2\text{S}_2\text{O}_8] / \text{mol dm}^{-3}$	$[\text{KI}] / \text{mol dm}^{-3}$	time / s
1	0.10	0.20	35
2	0.05	0.20	70
3	0.10	0.067	105
4	0.02	0.75	y

What is the value of **y** in experiment 4?

- A** 40 s
- B** 47 s
- C** 60 s
- D** 72 s

- 16 The diagram shows the reaction pathway diagram for an uncatalysed reaction.



The reaction is then catalysed.

What are the changes in the rate constant and the reaction pathway diagram?

	rate constant	energy profile
A	decrease	
B	decrease	
C	increase	
D	increase	

- 17 Archaeologists used ^{14}C , a radioactive isotope, in carbon dating. An artefact is analysed and its ^{14}C content is measured to be 20% of the typical initial amount of ^{14}C in trees. Given that the radioactive decay of ^{14}C has a half-life of 5500 years, what is the approximate age of this artefact?

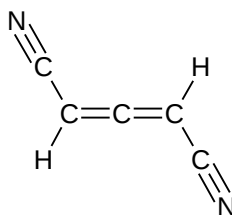
- | | | | |
|----------|--------------------------|----------|--------------------------|
| A | 1.10×10^4 years | C | 1.38×10^4 years |
| B | 1.28×10^4 years | D | 1.65×10^4 years |

- 18 Consider the following three compounds with molecular formula of C_5H_{12} :

- (I) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
 (II) $(\text{CH}_3)_3\text{CCH}_3$
 (III) $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_3$

Arrange the boiling points of the compounds in **decreasing** order.

- A** III, II, I
B II, I, III
C II, III, I
D I, III, II
- 19 What is the total number of isomers possible for the molecular formula of $\text{C}_2\text{H}_2\text{Br}_2$?
- A** 1
B 2
C 3
D 4
- 20 Which statement is **incorrect** for the compound shown below?



- A** There are 6 π bonds.
B There are 8 σ bonds.
C There is 0 lone pair of electrons in this molecule.
D The molecule is planar.