2018-DSE
CHEM
PAPER 1B

B

Level 5 Exemplar
Paper 1B

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2018

CHEMISTRY PAPER 1

SECTION B: Question-Answer Book B

This paper must be answered in English

INSTRUCTIONS FOR SECTION B

(1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3, 5, 7 and 9.

(2) Refer to the general instructions on the cover of the Question Paper for Section A.

(3) This section consists of TWO parts, Parts I and II.

(4) Answer ALL questions in both Parts I and II. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

(5) An asterisk (*) has been put next to the questions where one mark will be awarded for effective communication.

(6) Supplementary answer sheets will be provided on request. Write your candidate number, mark the question number box and stick a barcode label on each sheet, and fasten them with string INSIDE this Question-Answer Book.

(7) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

* A 1 4 0 E 0 1 B *

PART I

Answer **ALL** questions. Write your answers in the spaces provided.

1. Lithium occurs naturally in two isotopes, ^{6}Li and ^{7}Li. It can form lithium nitride (Li_3N) when burnt in air.

(a) (i) Calculate the percentage abundance of ^{6}Li in nature.
(Relative atomic mass: Li = 6.9)

let y% be the percentage abundance of ^{6}Li

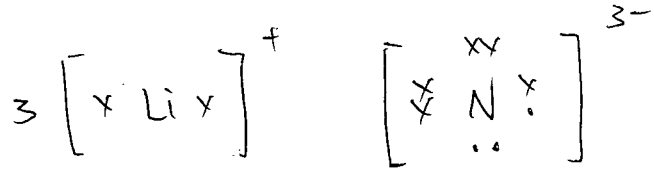
$6 \times y\% + 7(100\% - y\%) = 6.9$

$7 - 6.9 = y\%$

$y = 10$

Ans: the percentage abundance of ^{6}Li is 10%

(ii) Draw the electron diagram for lithium nitride, *showing electrons in the outermost shells only.*



(3 marks)

1. (b) In an experiment, 1.25 g of lithium nitride is formed when a piece of lithium is burnt in air.

(i) Write a chemical equation for the reaction involved.

$$3Li + N_2 \xrightarrow{\Delta} Li_3N + O_2$$

(ii) Calculate the mass of lithium that reacted with nitrogen.
(Relative atomic masses: Li = 6.9, N = 14.0)

no. of moles of Li_3N formed

$$= \frac{1.25}{6.9 \times 3 + 14}$$

$$= 0.036023054 \text{ mol}$$

mass of lithium $= 6.9 \times 0.036023054 \times 3$

$= 0.746$ g

(3 marks)

(c) Name another compound which will also be formed when lithium is burnt in air.

lithium oxide.

(1 mark)

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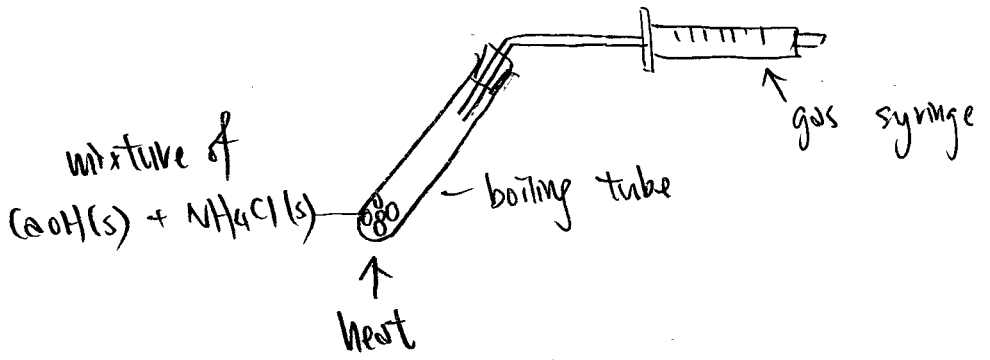
$NH_3(g)$

2. This question involves the preparation of ammonia gas and the investigation of the properties of ammonia gas in a laboratory.

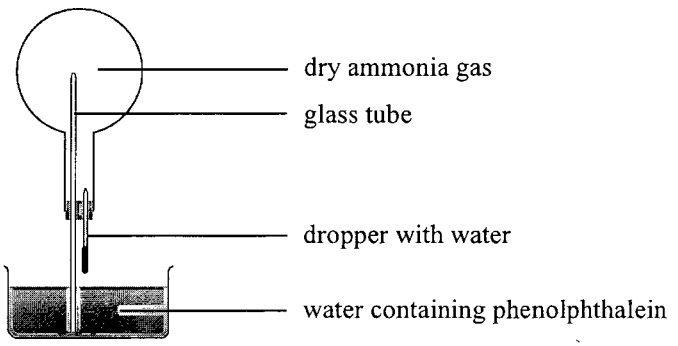
(a) Solid calcium hydroxide ($Ca(OH)_2(s)$) reacts with solid ammonium chloride to form ammonia gas. Draw a labelled diagram to show the set-up involved and how ammonia gas is collected.



(2 marks)

$NH_3(g)$

(b) An experiment was performed to investigate the properties of ammonia gas with the set-up shown below :



The round-bottomed flask was initially full of dry ammonia gas. Several drops of water were injected into the flask from the dropper. The water containing phenolphthalein was then automatically sucked into the flask through the glass tube.

(i) Briefly explain why the water containing phenolphthalein was sucked into the flask.

NH_3 is highly soluble in water so the no. of moles of gas decrease when water is added by dropper. The pressure inside the flask will decrease. The difference in pressure will push the water to be sucked into the flask.

(ii) State, with explanation, an observation related to phenolphthalein in the flask.

It changes from colourless to pink. as NH_3 is a alkaline gas and it will dissolve in water to form alkaline solution.

(4 marks)

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3. (a) Explain whether $BaCl_2$ or OCl_2 would have a higher melting point.

$BaCl_2$ has a higher melting point than OCl_2.
For $BaCl_2$, it has a giant ionic structure and there are strong ionic bonds between Ba^{2+} and Cl^- ions.
For OCl_2, it has a simple molecular structure and its molecules are held by weak van der Waals' force.

(2 marks)

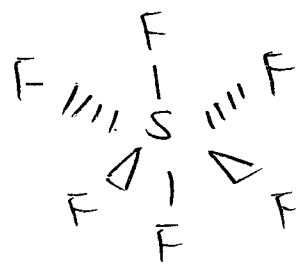
(b) Explain the following decreasing order of the boiling points of three substances :

$NH_3 > PH_3 > CH_4$

NH_3 and PH_3 is polar as it has a trigonal pyramidal shape while CH_4 is non-polar as it has a tetrahedral shape. Polar molecules will have a higher boiling point than non-polar molecules. Thus, boiling point of NH_3 and PH_3 is higher than CH_4.
For NH_3 and PH_3, the electronegativity of N is higher than P, thus the polarity of N-H bonds is higher than P-H bonds. Thus NH_3 is more polar than PH_3 and thus has the highest boiling points

(3 marks)

(c) Draw a three-dimensional diagram to represent the molecular shape of SF_6.



(1 mark)

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4. Petroleum is an important source of hydrocarbons.

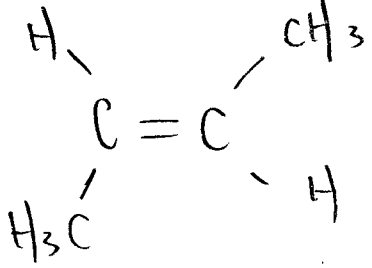
(a) Describe the origin of petroleum.

Petroleum is the remains of the death plants and small marine animals of millions years ago. Under high pressure, and action of the bacteria, petroleum is formed.

(2 marks)

(b) **D**, **E** and **F** are isomeric alkenes containing four carbon atoms. **D** and **E** are *cis-trans* isomers.

(i) Draw the structure of **E** (*trans*-isomer).



(ii) State the systematic name of one possible structure of **F**.

but-1-ene.

(2 marks)

(c) Ethene and ethane are hydrocarbons.

(i) Suggest how ethene can be converted to ethane.

Heat ethene with H_2 with platinum as catalyst.

(ii) Suggest a chemical test to distinguish between ethane and ethene.

Add $Br_2(aq)$ into ethene and ethene separately in a dark environment. If $Br_2(aq)$ decolorize, it is ethene.

(3 marks)

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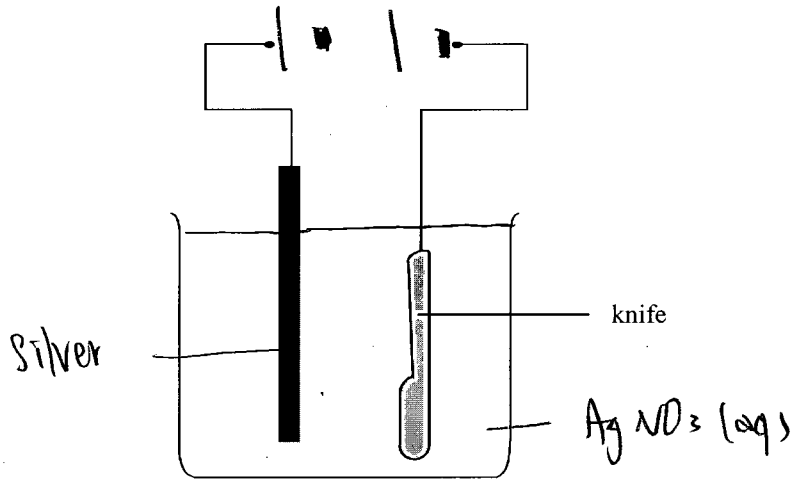
5. Electroplating and rust prevention are common applications of electrochemistry.

(a) The diagram below shows an incomplete set-up. Add suitable drawings and labels to the diagram for electroplating of silver onto the knife.



(2 marks)

(b) Suggest a method, besides painting or electroplating, that can prevent underground iron-made pipelines from rusting. Explain your answer.

We may use cathodic protection which connect the iron-made pipelines to the negative terminal so that it can provides electrons to the iron from preventing it to form Fe ions and rust.

(2 marks)

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6. Energy exists in various forms.

(a) Glucose ($C_6H_{12}O_6$) is one important energy source for living things.

(i) Write a chemical equation for the conversion of carbon dioxide gas and liquid water to solid glucose and oxygen gas.

$6CO_2(g) + 6H_2O(l) \longrightarrow C_6H_{12}O_6(s) + 6O_2(g)$

(ii) The following standard enthalpy changes of formation are given :

$CO_2(g) = -394\ kJ\ mol^{-1}$, $H_2O(l) = -286\ kJ\ mol^{-1}$, $C_6H_{12}O_6(s) = -1274\ kJ\ mol^{-1}$

Calculate the standard enthalpy change of the conversion in (i) above.

Standard enthalpy change

$= -1274 - (-286) \times 6 - (-394) \times 6$

$= +2806\ kJ\ mol^{-1}$ //

(iii) Green plants can convert carbon dioxide and water to glucose and oxygen. State the transformation of energy in this conversion.

It converts heat to chemical energy.

(4 marks)

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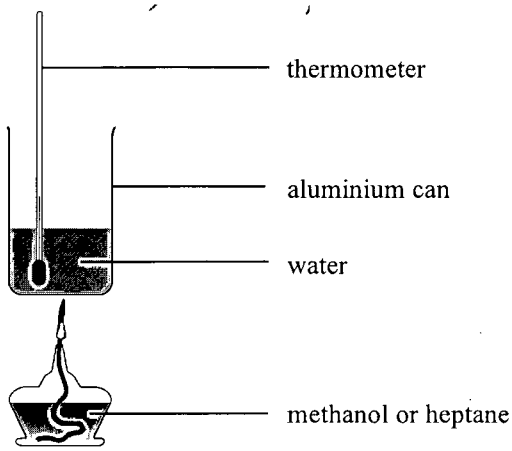
6 (b) Burning heptane (C_7H_{16}) releases energy. The enthalpy change of combustion of heptane was determined using the set-up shown below :



Step (I) : The aluminium can with a fixed mass of water was heated by burning methanol. The temperature of water increased by 18.5 °C after 1.58 g of methanol was burnt.

Step (II) : The aluminium can with the same mass of water in Step (I) was heated by burning heptane. The temperature of water increased by 25.8°C after 1.02 g of heptane was burnt.

(i) Given that, under the conditions of experiment, the enthalpy change of combustion of methanol is –715 kJ mol^{-1}, calculate the enthalpy change of combustion of heptane, in kJ mol^{-1}, under the same conditions.
(Relative molecular masses: methanol = 32.0, heptane = 100.0)

Let m be the mass of water and
c be the specific heat capacity.

$$-715 = \frac{mc(18.5)}{\frac{1.58}{32}}$$

$$mc = -1.9082702$$

Ans = Enthalpy change of combustion of heptane

$$= \frac{-1.9082702 \times (25.8)}{\frac{1.02}{100}}$$

$$= -4830\ kJ\ mol^{-1}$$ //

(ii) Besides heat loss, suggest another source of error in the experiment.

heptane and methanol may not undergo complete combustion.

(4 marks)

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7. An experiment was performed to determine the number of water of crystallisation, **n**, in a sample of hydrated sodium tetraborate ($Na_2B_4O_7 \cdot nH_2O$). 0.452 g of the sample was dissolved completely in about 50 cm^3 of deionised water in an apparatus **X**. The solution obtained was alkaline and was immediately titrated in **X** with 0.125 M HCl(aq) using methyl orange as an indicator. It required 18.98 cm^3 of the acid to reach the end point.

(a) Name **X**.

conical flask.

(1 mark)

(b) State the colour change at the end point of the titration.

It changes from red to orange.

(1 mark)

(c) It is known that in the reaction during the titration, the mole ratio of $B_4O_7^{2-}(aq)$ to $H^+(aq)$ is 1 : 2. Calculate the number of water of crystallisation, **n**.
(Relative atomic masses: H = 1.0, B = 10.8, O = 16.0, Na = 23.0)

no. of moles of HCl used

$= \frac{18.98}{1000} \times 0.125$

$= 2.3725 \times 10^{-3}$ mol

Mass of $Na_2B_4O_7$ reacted

$= \frac{2.3725 \times 10^{-3}}{2} \times (23 \times 2 + 10.8 \times 4 + 16 \times 7)$

$= 0.2386735$ g

mass of H_2O $= 0.452 - 0.2386735$

$= 0.2133265$

$\frac{\text{no. of mole of } Na_2B_4O_7}{\text{no. of mole of } H_2O} = \frac{\frac{2.3725 \times 10^{-3}}{2}}{\frac{0.2133265}{2+n}}$

≈ 0.1

(3 marks)

Ans: the no. of water of crystallisation is 10.

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7. (d) It is known that hydrated sodium tetraborate can be used to prepare standard solutions.

(i) What is meant by the term 'standard solutions' ?

It is the solution of known molarity.

(ii) Suggest one use of standard solutions.

It can be used to prepare required solution of desired molarity.

(2 marks)

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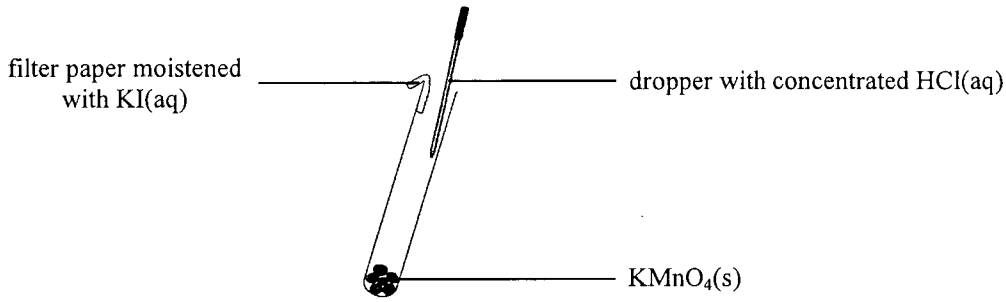
8. Refer to the experimental set-up as shown below.



(a) HCl is a strong acid. What is meant by the term 'strong acid' ?

it means that molecules of the acid highly ionized in water to form ions.

(1 mark)

(b) When concentrated HCl(aq) is dropped into $KMnO_4(s)$, a yellowish green gas is formed.

(i) What is the yellowish green gas ?

it is $Cl_2(g)$.

(ii) Explain whether the reaction forming the yellowish green gas is a redox reaction.

As the oxidation no. of Cl changes from -1 in HCl to 0 in Cl_2, it is a redox reaction.

(2 marks)

(c) With the aid of an ionic equation, state the expected observation when the yellowish green gas reaches the filter paper.

$Cl_2(g) + 2I^-(aq) \rightarrow 2Cl^-(aq) + I_2(g)$

yellowish green gas dissolve in the filter paper and purple gas is formed.

(2 marks)

(d) In consideration of laboratory safety, explain where the experiment should be performed.

It should be performed in fume cupboard as Cl_2 is toxic.

(1 mark)

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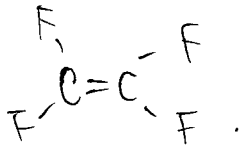
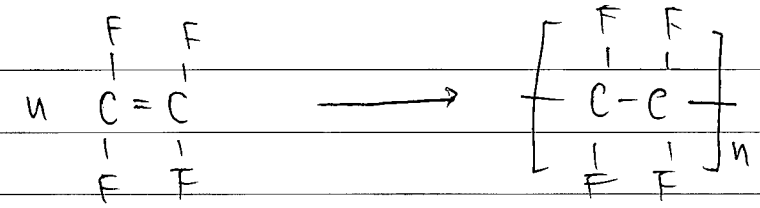
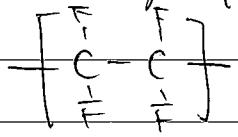


*9. Tetrafluoroethene undergoes polymerisation to form a polymer called 'Teflon'. Using this example, describe this type of polymerisation.

(5 marks)



Under higher pressure and temperature, tetrafluoroethene will undergo polymerization with monomer



Large amount of monomers join up together repeatedly to be polymer is polymerization.

As shown in the above equation, no small particles is formed during polymerization, so it is a additional polymerization.

the exist of carbon - carbon double bond of tetrafluoroethene ensures it to be undergoing additional polymerization.

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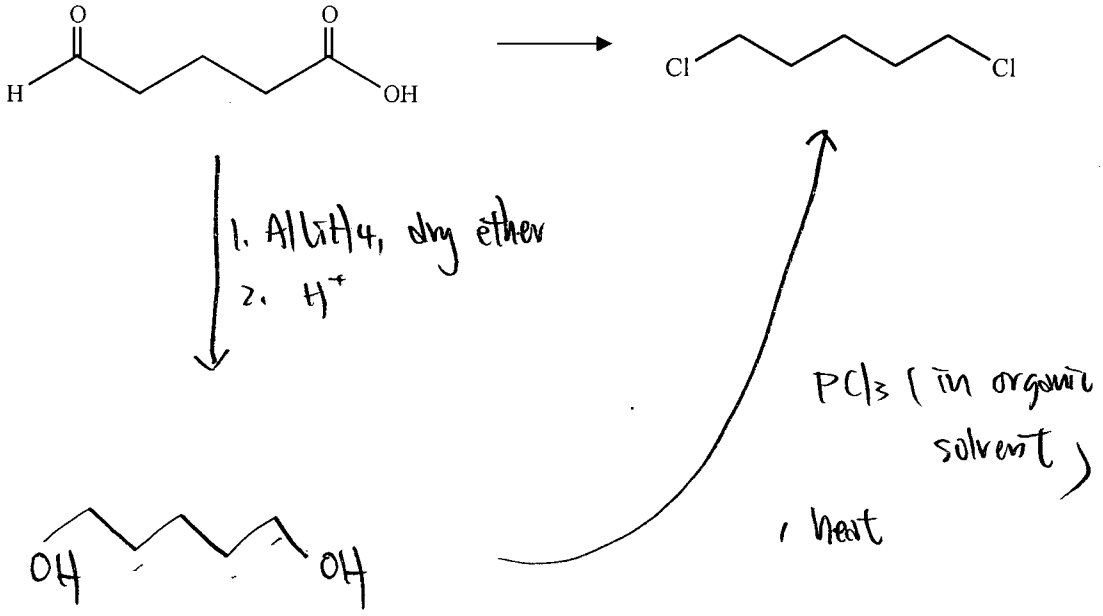
PART II

Answer **ALL** questions. Write your answers in the spaces provided.

10. Outline a synthetic route, with *no more than three steps*, to accomplish the following conversion. For each step, give the reagent(s), reaction conditions (as appropriate) and structure of the organic product.



(3 marks)

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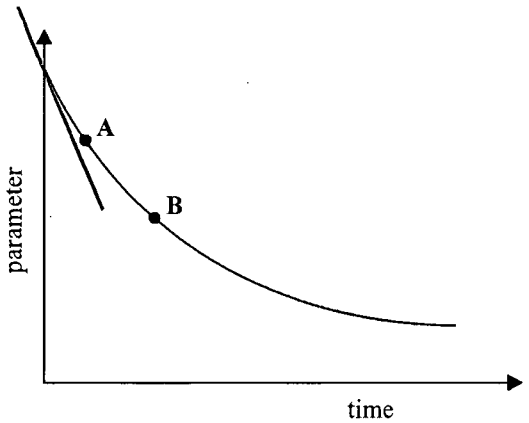
11. Consider the following reaction :

$$Br_2(aq) + HCO_2H(aq) \rightarrow 2HBr(aq) + CO_2(g)$$

In an experiment to study the rate of consumption of $Br_2(aq)$, equal volumes of 0.01 M $Br_2(aq)$ and 1.0 M $HCO_2H(aq)$ were mixed. The progress of the reaction was followed by measuring a certain parameter of the reaction system using a colorimeter. The graph below shows the results from the start of the reaction.



(a) Assume that the rate of change of the parameter with time can represent the rate of reaction.

(i) According to the shape of the curve above, suggest what the parameter should be.

Concentration of $Br_2(aq)$.

(ii) The initial rate of the reaction can be determined by a suitable sketch on the above graph. Draw the suitable sketch on the above graph, and describe how the initial rate of the reaction can be obtained from the sketch.

Initial rate can be determined by the slope of tangent of the instantaneous rate at $t = 0$ s.

(iii) According to the graph above, the rate of reaction at **A** is higher than that at **B**. Explain this at molecular level.

At A, the concentration of $Br_2(aq)$ is higher than that at B. The no. of moles of Br_2 molecules per unit volume is larger and the no. of effective collisions per unit time also larger than that at B. Thus, the rate of reaction of A is higher than that at B.

(5 marks)

(b) Suggest another method that can follow the progress of the reaction.

The volume of gas emitted with respect to time as $CO_2(g)$ is formed.

(1 mark)

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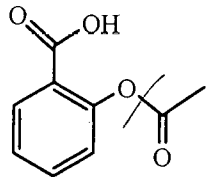
12. Aspirin is a pain-killer. Its structure is shown below :



(a) State one medical application of aspirin other than pain-killing.

It can cure fever.

(1 mark)

(b) Explain why a suspension of aspirin and water can become clear when sodium hydrogencarbonate powder is added.

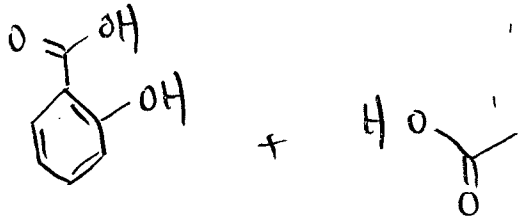
$NaHCO_3$

Aspirin has a carboxyl group which ensures it to have acidic property. It will react with $NaHCO_3$ to form ionic compound, which is soluble in water. Thus, the water become clear.

(2 marks)

(c) Heating aspirin with excess dilute aqueous acid under reflux will give two organic products.

(i) Draw the structures of these two organic products.



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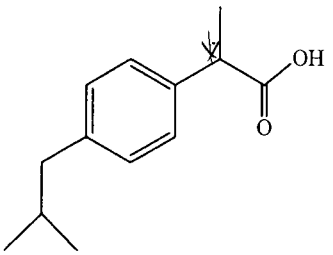
12. (c) (ii) Explain why the conversion of aspirin to these two organic products can hardly reach 100% even though the mixture of aspirin and dilute acid is heated under reflux for a long time.

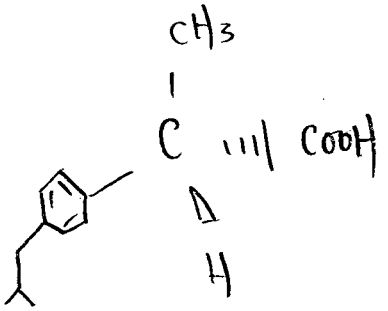
The hydrolysis of ester in acidic medium is a reversible reaction.

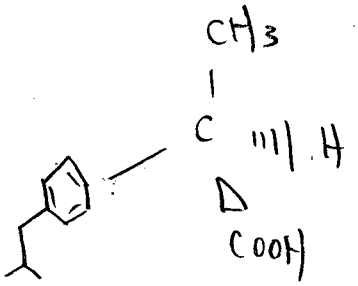
(3 marks)

(d) Ibuprofen is also a pain-killer. Its structure is shown below :



There exists enantiomerism in ibuprofen. Draw the three-dimensional structures for the pair of enantiomers.





(2 marks)

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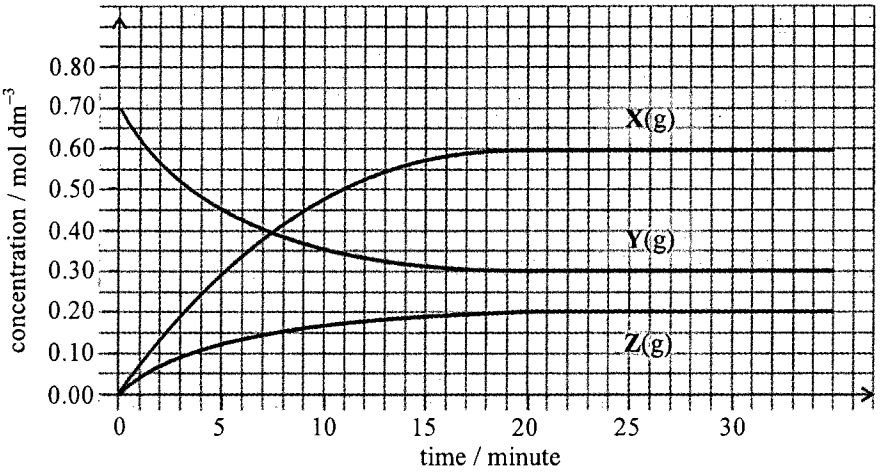
13. An experiment was performed for a reversible reaction involving **X**(g), **Y**(g) and **Z**(g) in a closed container of 2.0 dm^3 at a constant temperature. The graph below shows the relevant experimental data.



(a) According to the graph, how do you know that the reaction is reversible ?

The concentration of three chemicals remains unchanged after some period of time and do not drop to zero.

(1 mark)

(b) Calculate the equilibrium constant K_c for the reaction at the temperature of the experiment.

$$2Y(g) \rightleftharpoons 3X(g) + Z(g)$$

$$K_c = \frac{[X(g)]^3_{eqm}\,[Z(g)]_{eqm}}{[Y(g)]^2_{eqm}}$$

$$= \frac{\left(\frac{0.6}{2}\right)^3 \left(\frac{0.2}{2}\right)}{\left(\frac{0.3}{2}\right)^2}$$

$$= 0.12 \text{ mol}^2 \text{ dm}^{-6}$$

(3 marks)

(c) Comment on the following statement :

'The rate of the forward reaction is zero at the 25th minute after the start of the reaction.'

It is false. The rate of forward reaction equals that of backward reaction and attain a dynamic equilibrium at 25 th minutes and do not equal zero.

(1 mark)

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*14. Using Na_2O, Al_2O_3 and SO_2 as examples, illustrate the acid-base behaviour of the oxides of the third period elements with the aid of relevant reactions.

(6 marks)

Na_2O has a alkaline property and will react with acid and form water

$$Na_2O + 2HCl \rightarrow 2NaCl + H_2O$$

SO_2 has a acidic property and will react with alkalis.

$$SO_2 + H_2O \rightleftharpoons H_2SO_3$$

$$H_2SO_3 + 2NaOH \rightarrow Na_2SO_3 + 2H_2O$$

Al_2O_3 has a amphoteric property and will react with both acid and alkalis.

$$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$$

$$3H_2O + Al_2O_3 + 2NaOH \rightarrow 2Na[Al(OH)_4]$$

END OF SECTION B
END OF PAPER

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PERIODIC TABLE 周期表

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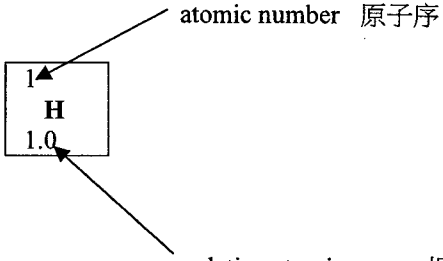


I	II										III	IV	V	VI	VII	0
				1 **H** 1.0												2 **He** 4.0
3 **Li** 6.9	4 **Be** 9.0										5 **B** 10.8	6 **C** 12.0	7 **N** 14.0	8 **O** 16.0	9 **F** 19.0	10 **Ne** 20.2
11 **Na** 23.0	12 **Mg** 24.3										13 **Al** 27.0	14 **Si** 28.1	15 **P** 31.0	16 **S** 32.1	17 **Cl** 35.5	18 **Ar** 40.0
19 **K** 39.1	20 **Ca** 40.1	21 **Sc** 45.0	22 **Ti** 47.9	23 **V** 50.9	24 **Cr** 52.0	25 **Mn** 54.9	26 **Fe** 55.8	27 **Co** 58.9	28 **Ni** 58.7	29 **Cu** 63.5	30 **Zn** 65.4	31 **Ga** 69.7	32 **Ge** 72.6	33 **As** 74.9	34 **Se** 79.0	35 **Br** 79.9	36 **Kr** 83.8
37 **Rb** 85.5	38 **Sr** 87.6	39 **Y** 88.9	40 **Zr** 91.2	41 **Nb** 92.9	42 **Mo** 95.9	43 **Tc** (98)	44 **Ru** 101.1	45 **Rh** 102.9	46 **Pd** 106.4	47 **Ag** 107.9	48 **Cd** 112.4	49 **In** 114.8	50 **Sn** 118.7	51 **Sb** 121.8	52 **Te** 127.6	53 **I** 126.9	54 **Xe** 131.3
55 **Cs** 132.9	56 **Ba** 137.3	57 * **La** 138.9	72 **Hf** 178.5	73 **Ta** 180.9	74 **W** 183.9	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.1	79 **Au** 197.0	80 **Hg** 200.6	81 **Tl** 204.4	82 **Pb** 207.2	83 **Bi** 209.0	84 **Po** (209)	85 **At** (210)	86 **Rn** (222)
87 **Fr** (223)	88 **Ra** (226)	89 ** **Ac** (227)	104 **Rf** (261)	105 **Db** (262)													

*	58 **Ce** 140.1	59 **Pr** 140.9	60 **Nd** 144.2	61 **Pm** (145)	62 **Sm** 150.4	63 **Eu** 152.0	64 **Gd** 157.3	65 **Tb** 158.9	66 **Dy** 162.5	67 **Ho** 164.9	68 **Er** 167.3	69 **Tm** 168.9	70 **Yb** 173.0	71 **Lu** 175.0
**	90 **Th** 232.0	91 **Pa** (231)	92 **U** 238.0	93 **Np** (237)	94 **Pu** (244)	95 **Am** (243)	96 **Cm** (247)	97 **Bk** (247)	98 **Cf** (251)	99 **Es** (252)	100 **Fm** (257)	101 **Md** (258)	102 **No** (259)	103 **Lr** (260)

2018 DSE (D)

香 港 考 試 及 評 核 局
HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

香 港 中 學 文 憑 考 試
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

答 題 簿
ANSWER BOOK

Level 5 Exemplar
Paper 2

由考生填寫 To be filled in by the candidate	由閱卷員填寫 Marker's Use Only	由試卷主席填寫 Examiner's Use Only
	閱卷員編號 Marker No.	試卷主席編號 Examiner No.

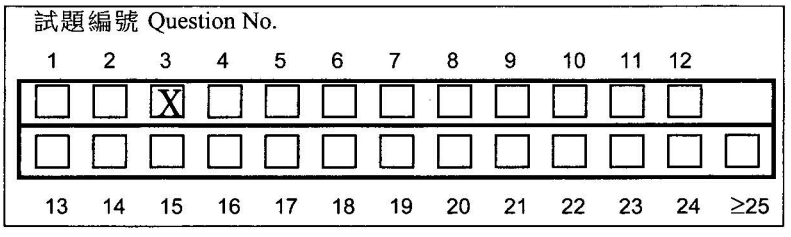
考生須知

(一) 宣布開考後，考生須首先在第 1 頁之適當位置填寫考生編號，並在第 1 及 3 頁之適當位置貼上電腦條碼。
(二) 每題(非指分題)必須另起新頁作答，並須在每一頁的相應試題編號方格填畫「X」號，以表示選答的題號(見下例)。
(三) 紙張兩面均應使用，並應每行書寫。不可在各頁邊界以外位置書寫。寫於邊界以外的答案，將不予評閱。
(四) 如有需要，可要求派發方格紙及補充答題紙。每一紙張均須填寫考生編號、填畫試題編號方格、貼上電腦條碼，並用繩縛於**簿內**。
(五) 試場主任宣布停筆後，考生不會獲得額外時間貼上電腦條碼及填畫試題編號方格。

INSTRUCTIONS

(1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1 and 3.
(2) Start each question (not part of a question) on a new page. Put 'X' in the corresponding question number box on each page to indicate the appropriate question number (see the example below).
(3) Write on both sides using each line. Do not write in the margins. Answers written in the margins will not be marked.
(4) Graph paper and supplementary answer sheets will be supplied on request. Write your Candidate Number, mark the question number box and stick a barcode label on each sheet, and fasten them with string INSIDE this book.
(5) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

例 Example:
試題編號 Question No. = 3



試題編號 Question No.	各頁積分 Marks	積分 Marks	積分 Marks
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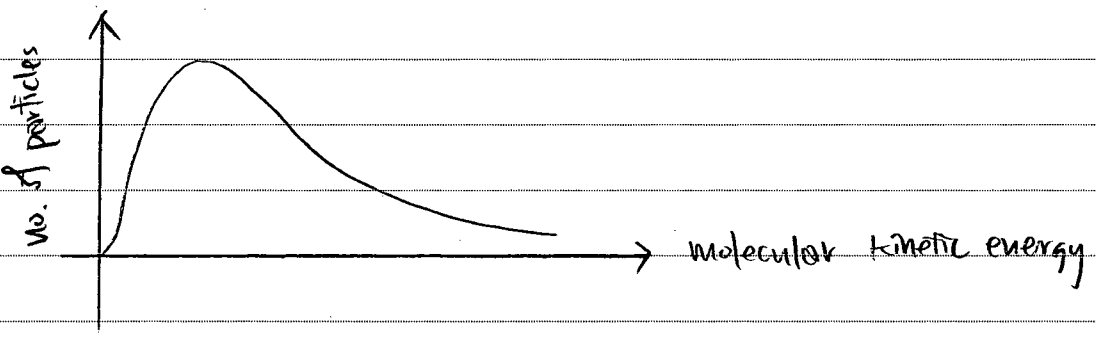
每題另起新頁作答。
Start each question on a new page.

1) a) i) $2Cl^-(aq) \rightarrow Cl_2(g) + 2e^-$

$2H^+(aq) + 2e^- \rightarrow H_2(g)$

ii)



iii) It is acetic acid.

b) i) 1) It is Al_2O_3

2) The average separation between gas molecules is large. The no. of moles of reactant per unit volume and so the effective collision per unit time decrease. Thus, the rate of reaction is slow.

3) The higher pressure will shift the equilibrium position of reaction to the side of smaller no. of moles of gas molecules, i.e the product side. Thus a higher pressure, ie. 100 atm can increase the yield of production of $CH_3OH(g)$.

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每題另起新頁作答。
Start each question on a new page.

1) b) ii) 1) In Reaction (I), toxic CO (g) is used while no toxic gas is used in Reaction (II). Thus, Reaction (II) is greener.

2) It can lower the emission of CO_2 by reacting it with $H_2(g)$. It helps alleviate the condition of global warming.

iii) $2CH_3OH \xrightarrow{\Delta} CH_3COOH + 2H_2$.

c) i) By $y = mx + c$, the slope of graph represent the order of $N_2O_5(g)$ with respect to $N_2O_5(g)$. It shows that the rate of reaction is directly proportional to concentration of $N_2O_5(g)$.

ii) slope of l_1 $= \dfrac{-1.4 - (-2.8)}{0 - (-1.4)}$

$= 1$

Ans: The order of reaction with respect to $N_2O_5(g)$ is 1.

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每題另起新頁作答。
Start each question on a new page.

1) c) (ii) By $\log r_0 = \log k + \log [N_2O_5(g)]_0$

$-2.8 = \log k + (-0.8)$

$k = 0.01 \ s^{-1}$ 1

(iv) From l_1,

$-2.2 = \log k' + (-0.8)$

$k' = 10^{-1.4} \ s^{-1}$

$\log 10^{-1.4} - \log 0.01 = \frac{E_a}{2.3 \times 8.31} \left(\frac{1}{345} - \frac{1}{360} \right)$

$E_a = 94.75384 \ kJ \ mol^{-1}$

$= 95.0 \ kJ \ mol^{-1}$ 4

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Start each question on a new page.

3) a) i) It may be Ca^{2+}.

ii) Add $KMnO_4/H^+$ (aq) to the K_2SO_3 (aq) and K_2SO_4 (aq) separately.
If the purple $KMnO_4/H^+$ (aq) decolourize, it is K_2SO_3. If there is no observable change, it is K_2SO_4 (aq).

iii) Rf value is the ratio of distance travelled by a substance to the distance travelled by the solvent.

b) i) Dissolve 1.63g of sample in the conical flask. Then, transfer the solution to a 250 cm^3 volumetric flask.
Next, wash the conical flask with small amount of deionized H_2O and pour all washing to the volumetric flask.
After that, add deionized water the the volumetric flask until it reach the graduation mark.
Final, stopper and invert the volumetric flask to mix the content well.

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Start each question on a new page.

3)b) ii) $4ClO_3^-(aq) + 10I^-(aq) + 24H^+(aq) \rightarrow 5I_2(aq) + 2Cl^-(aq)$

iii) It changes from pale yellow to red-orange.

iv) no. of moles of $Na_2S_2O_3$ (aq) used.

$= \frac{27.88}{1000} \times 0.112$

$= 3.12256 \times 10^{-3}$ mol

no. of moles of I_2 reacted with $Na_2S_2O_3$

$= 3.12256 \times 10^{-3} \div 2$

$= 1.56128 \times 10^{-3}$ mol

Mass of $NaClO_3$ reacted

$= 1.56128 \times 10^{-3} \times \frac{4}{5} \times (23 + 35.5 + 16 \times 3)$

$= 0.13302156$

Ans = Percentage by mass $= \frac{0.13302156}{1.63} \times 100\%$

$= 8.16\%$ //

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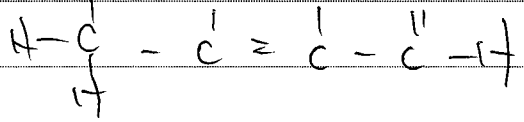
每題另起新頁作答。
Start each question on a new page.

3) c) i) It is because X and Y has similar boiling point.

ii) 1) The absorption peak at 1700 cm^{-1} in the infra-red spectrum indicates X has carbonyl group.

2) Chemical species at m/z = 43 is $C_3H_7^+$
Chemical species at m/z at 55 is $C_3H_3O^+$

3)



iii) The positive result in 2,4-dinitrophenylhydrazine test indicates that Y has carbonyl group.
The ~~test~~ negative result in Tollen's reagent test indicate Y is not a aldhyde.
Thus, Y is a ketone

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