



2014-DSE
CHEM

PAPER 1B

B

Level 5 Exemplar & Comments

Paper 1B

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2014

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.

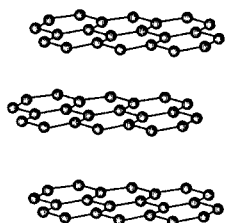
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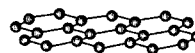
PART I

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

1. Graphite is a form of carbon and has a layer structure. Graphene is an individual single layer of graphite. Their structures are shown below:



graphite



graphene

- (a) Thin sheets of graphene can be easily peeled off from graphite using adhesive tape.

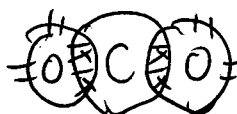
- (i) Explain why graphene can be easily peeled off.

There is van der Waals' force within graphite layer. Van der Waals' force is weak than can be overcome by the adhesive force of the tape.

- (ii) Explain whether graphene can conduct electricity.

No. There is no mobile ions and delocalized electrons in graphene.

- (iii) Draw the electron diagram for a molecule of the compound formed by complete combustion of graphene, showing *electrons in the outermost shells only*.



(3 marks)

- (b) Based on the fact that graphene can be easily peeled off from graphite, a student concluded that graphite should have a low melting point due to its layer structure. Explain whether you agree with this conclusion.

I disagree with this conclusion. In each graphite layer, the carbon atoms are covalently bonded to each other. Because covalent bond is strong, the melting point of graphite should be high. (1 mark)

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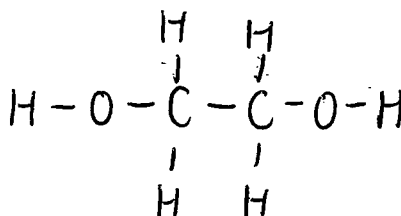
1. (c) Fullerene (such as C_{60}) is another form of carbon. Briefly describe the structure of C_{60} , and suggest why it is soluble in some organic solvents.

C_{60} has a soccer-like structure, in which one carbon atom is covalently bonded four other carbon atom. 60 carbon atoms form a fullerene.

Among each fullerene molecules, van der Waals' force exists.

It is soluble in some organic solvents because it is non-polar and its molecules are held by van der Waals' force. (3 marks)
By like-dissolve-like principle, it dissolves in some organic solvent.

2. Draw the structure of ethane-1,2-diol, and suggest whether it is soluble in water.



It is soluble in water. The OH group in the molecules allows it to form hydrogen bond with water.

By forming the hydrogen bond, ethan-1,2-diol is soluble in water, which also form hydrogen bonds among its molecules.

(3 marks)

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3. Both polyethene (PE) and 'Saran' can be used to make food wrap, but 'Saran' is more suitable than PE in making food wrap for use in microwave ovens.

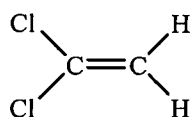
- (a) The monomer of PE is ethene. Suggest a chemical test to show that ethene is an unsaturated compound.

Add Bromine In CCl_4 In the sample of ethene In dark.

The rapid decolourisation of orange colour shows the unsaturation of ethene.

(2 marks)

- (b) 'Saran' can be formed from the polymerisation of the compound shown below:



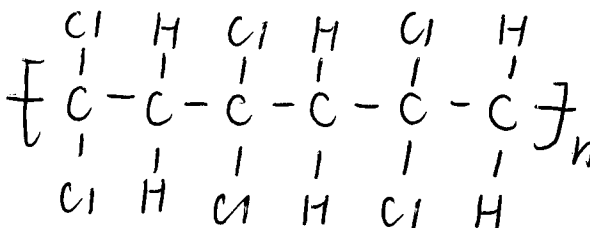
- (i) State the systematic name of this compound.

dichloroethene.

- (ii) Name the type of polymerisation involved in forming 'Saran'.

addition polymerization

- (iii) Draw the structure of 'Saran', showing at least THREE repeating units.



(3 marks)

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3. (c) In terms of intermolecular force, explain why 'Saran' is more suitable than PE in making food wrap for use in microwave ovens.

Saran has larger molecular mass than PE for each repeating unit. Saran, hence, has stronger van der Waals' force. This allows Saran less likely melt than PE in the heating process of microwave ovens.

(2 marks)

- (d) When incinerated, why would food wrap made from 'Saran' cause more serious pollution problem than food wrap made from PE?

Saran has Cl as its constituent element. Burning Saran will give toxic gases like dioxins.

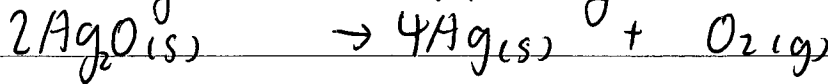
(1 mark)

*4.

With reference to the methods of obtaining copper, magnesium and silver from their oxides, deduce the order of reactivity of these three metals.

(5 marks)

Extracting silver can be done by simply heating its oxide, letting it decompose.



Extracting copper needs a more complexed process.

First, heating the copper ore with sufficient oxygen to get copper (II) oxide. Then, heat the copper (II) oxide with carbon as reducing agent to get the copper metal.

Extracting magnesium can only use electrolysis. This means its ore is the most stable among the three metal ore.

∴ The reactivity order:



⊗ This is done according to the easiness of extracting the metal from their ore.

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5. Concentrated acids are common reagents found in laboratories.

(a) State a safety measure in handling concentrated acids in laboratories.

Wear safety goggles.

(1 mark)

(b) Comment on the following statement:

'All concentrated acids are strong acids.'

The statement is wrong. Strong acids means the extent of ionization of acid molecule is high. There is nothing deal with concentration.

(1 mark)

(c) Explain how concentrated sulphuric acid, concentrated nitric acid and concentrated ethanoic acid can be distinguished by using copper granules.

Copper granules react with acid to give gases. Putting copper granules to the acid, they can be distinguished, by observing the rate and the colour of the gas evolved.

The one which give brown gas is concentrated nitric acid. Because concentrated nitric acid react with copper to give $\text{NO}_2(\text{g})$ which is brown.

(3 marks)

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每題另起新頁作答。

Start each question on a new page.

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(c) Then by observing the rate of gas evolved, The one has a high rate of gas bubble evolved is concentrated sulphuric acid. 195 sulphuric acid is a strong acid ~~with~~ while ethanoic acid is a weak one, sulphuric acid has high extent of ionization of its molecules. Hence, concentrated sulphuric acid gives out bubbles at a faster rate.

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6. (Petrol is a commonly used motor car fuel. It can be obtained from petroleum by fractional distillation.

- (a) (i) Explain, from molecular level, why petrol can be obtained from petroleum by fractional distillation.

Petroleum is a mixture of alkanes of different size.

Different size of alkanes can be separated by fractional distillation because they have different boiling points.

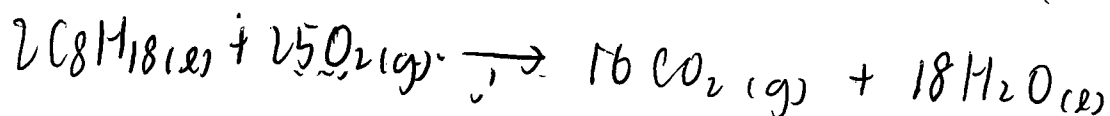
- (ii) Other than directly obtaining petrol from fractional distillation of petroleum, suggest a way for producing extra petrol.

Cracking of large alkane molecules.

- (iii) Octane (C_8H_{18}) is a component of petrol. Using octane as an example, state the meaning of the term 'standard enthalpy change of combustion' with the aid of a chemical equation.

Standard enthalpy change of combustion means the enthalpy change of one mole of the compound, in this case octane, when it undergoes complete combustion at standard condition and in its standard state.

(5 marks)



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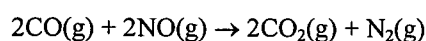
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6. (b) Motor cars powered by petrol emit air pollutants such as nitrogen monoxide and carbon monoxide. Installing a certain device in motor cars can convert these two oxides to less harmful substances.

- (i) Name this device.

catalytic converter

- (ii) The equation for the reaction involved in the conversion is shown below:



The standard enthalpy changes of formation of NO(g), CO(g) and CO₂(g) are as follows:

Compound	$\Delta H_f^\circ / \text{kJ mol}^{-1}$
NO(g)	+90.3
CO(g)	-110.5
CO ₂ (g)	-394.0

Calculate the standard enthalpy change of the above reaction.

$$\Delta H^\circ + 2(-110.5) + 2(+90.3) = 2(-394.0)$$

$$\Delta H^\circ = -747.6 \text{ kJ mol}^{-1}$$

∴ The required standard enthalpy change is -747.6 kJ mol⁻¹

(4 marks)

7. A bottle of concentrated hydrochloric acid HCl(aq) is shown below:



- (a) According to the information on the label, calculate the concentration of the concentrated hydrochloric acid in mol dm⁻³.

mass of HCl per cm³ :
 $1.18 \times 36\% = 0.4248 \text{ g cm}^{-3}$
 concentration of HCl:

$$\frac{0.4248}{(1.0 + 35.5)} \times 1000$$

 $= 11.6384 \text{ mol dm}^{-3}$

(2 marks)

- (b) To find out the concentration of the concentrated acid, a laboratory technician first drew from the bottle a sample of 10.00 cm³ of the concentrated acid and diluted it to 100.0 cm³ in a volumetric flask. The diluted acid sample was then used to titrate a standard sodium carbonate solution placed in a conical flask using methyl orange as an indicator. 10.00 cm³ of 1.06 mol dm⁻³ sodium carbonate solution required 20.30 cm³ of the diluted acid sample to reach the end point.

- (i) Briefly describe the procedure in preparing a standard sodium carbonate solution.

Add known mass Na₂CO₃(s) to a beaker.
 Add distilled water to it and stir
 it until it is totally dissolved.
 Pour the solution to the volumetric
 flask.
 Add distilled water up to the
 graduated mark.

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7. (b) (ii) Using the titration result, calculate the concentration, in mol dm^{-3} , of the concentrated hydrochloric acid in the bottle.

Let x be the required concentration.
 $2\text{HCl} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$

$$\frac{(0.1) \times \left(\frac{20.30}{1000}\right)}{(11.06) \left(\frac{10}{1000}\right)} = \frac{2}{1}$$

$$x = 10.4433 \text{ mol dm}^{-3}$$

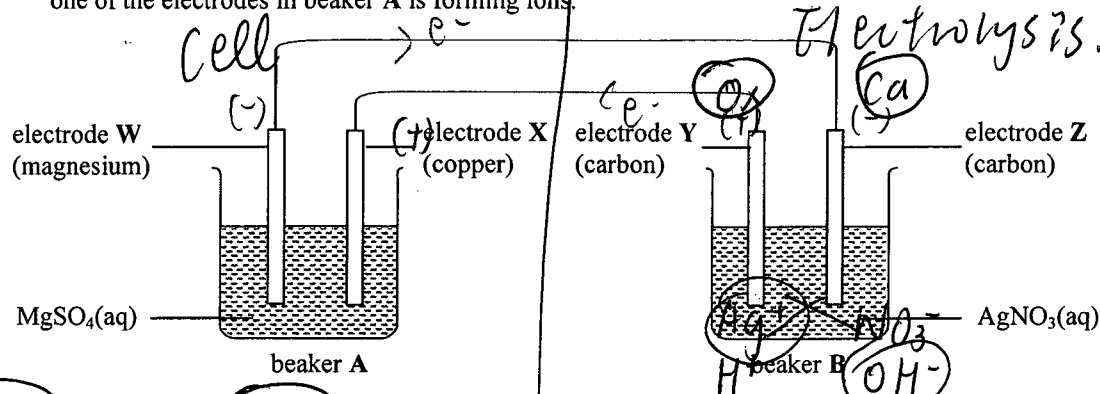
(5 marks)

- (c) Suggest a possible reason why the concentration of the concentrated hydrochloric acid in the bottle obtained from (b)(ii) would be smaller than that obtained from (a) above.

Some HCl is evaporated as mist.

(1 mark)

8. The diagram below shows a set-up in which electrons are flowing through the electric wires. Moreover, one of the electrodes in beaker A is forming ions.



(a) State an expected observation at each of the following electrodes:

- (i) electrode W

Dissolve gradually.

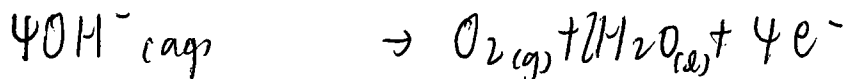
- (ii) electrode X

Colourless gas bubbles formed near electrode X.

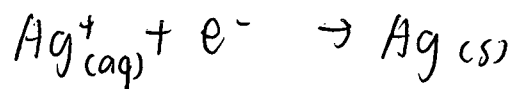
(2 marks)

- (b) Write the half equation for the expected change at each of the following electrodes:

- (i) electrode Y



- (ii) electrode Z



(2 marks)

- (c) Complete the following table by filling in 'anode' or 'cathode' to describe the electrodes.

	electrode W	electrode Z
anode / cathode	anode	cathode

(1 mark)

- (d) Predict, with reason, what would happen if the $\text{MgSO}_4(\text{aq})$ in beaker A is replaced by ethanol

There will be no electron flow in the external circuit as ethanol has no mobile ions. The circuit is not complete.

(1 mark)

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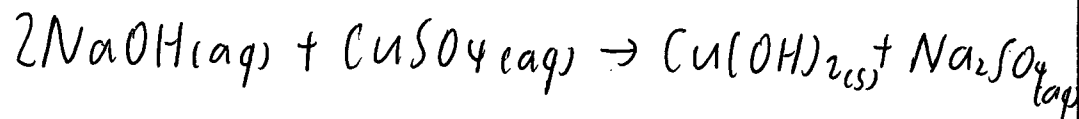
9. Consider each of the experiments below and answer the questions that follow.

(a) Dilute sodium hydroxide solution is added to copper(II) sulphate solution.

(i) State the expected observation.

a blue precipitate is formed.

(ii) Write the chemical equation for the reaction that occurs.



(b) Acidified potassium ~~permanganate~~ solution is added to sodium ~~sulphite~~ solution.

(i) State the expected colour change.

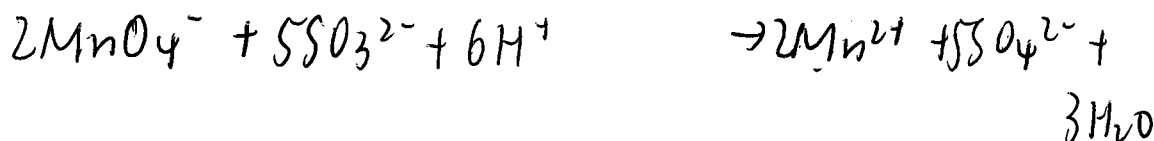
purple to very pale pink.

(ii) For the reaction leading to the colour change,

(1) state the name of the type of reaction; and

Redox reaction.

(2) write the ionic equation for the reaction.



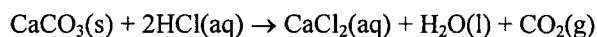
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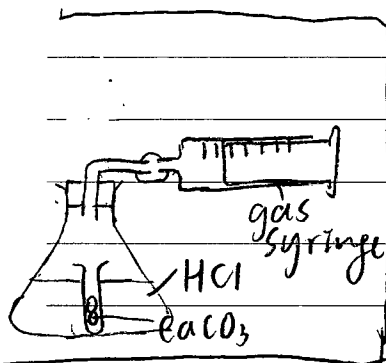
PART II

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

- *10. You are provided with common laboratory apparatus, calcium carbonate and 1M hydrochloric acid. Outline how you would perform a fair comparison in studying the effect of different concentrations of acid on the rate of production of carbon dioxide from the following reaction:



(5 marks)



For each set of experiment, prepare the same volume of $\text{HCl}(\text{aq})$, with different concentration and the same mass of $\text{CaCO}_3(\text{s})$.

Put the $\text{CaCO}_3(\text{s})$ in a small test tube as shown and put the it in the flask containing HCl .

Stopped the flask and connect it to a graduated gas syringe.

Gently shake the flask to allow reaction to occur.

Measure the time taken for complete reaction, which is indicated by the disappearance of $\text{CaCO}_3(\text{s})$, by stopwatch.

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每題另起新頁作答。

Start each question on a new page.

Take the reading of ^{volume} gas evolved.

Then calculate the ^{average} rate of production of CO₂ evolved in different runs by

$$\text{rate} \propto \frac{\text{volume of CO}_2 \text{ evolved}}{\text{time}}$$

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11. Vanadium is a transition metal, its chemical symbol is V. The formulae and the colours of three aqueous vanadium-containing ions are shown below:

Formula	$\text{VO}_2^{2+}(\text{aq})$	$\text{V}^{3+}(\text{aq})$	$\text{V}^{2+}(\text{aq})$
Colour	blue	green	violet

- (a) Based on the given information, suggest TWO properties of vanadium to characterise it as a transition metal.

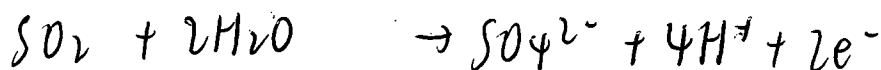
It has varying oxidation state.

It can form coloured ions.

(1 mark)

- (b) Vanadium also forms the ion $\text{VO}_2^{+}(\text{aq})$. In the presence of acid, 1.0 mol of $\text{VO}_2^{+}(\text{aq})$ ions and 1.0 mol of $\text{SO}_2(\text{g})$ react completely to form $\text{SO}_4^{2-}(\text{aq})$ ions and one of the above aqueous vanadium-containing ions.

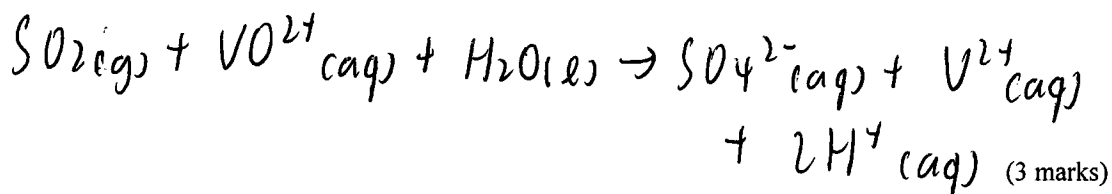
- (i) By considering the amount of electrons transferred, deduce the final colour of the solution obtained.



The electron transferred is to number of

$\therefore$ ~~the~~ $\text{V}^{2+}(\text{aq})$ will be formed at the end of the experiment

- (ii) Write a chemical equation for the reaction in (i).
The colour of the solution obtained is violet.

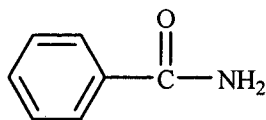


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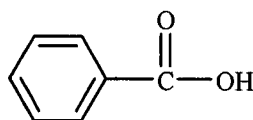
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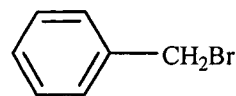
12. Benzamide, benzoic acid and benzyl bromide are commonly used organic compounds. Their structures are shown below:



benzamide



benzoic acid



benzyl bromide

- (a) In an experiment, benzoic acid is prepared from benzamide in two steps:

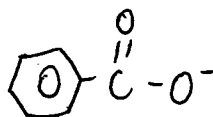
Step 1: Benzamide is added to excess 1M NaOH(aq) and the mixture is heated gently. An organic compound **X** is formed.

Step 2: The resulting mixture is then treated with reagent **Y** until no more solid benzoic acid is given out.

- (i) Name the type of reaction involved in Step 1.

Alkaline hydrolysis.

- (ii) Draw the structure of **X**.



- (iii) Suggest what **Y** would be.

dilute sulphuric acid.

- (iv) Suggest why **X** is more soluble than benzoic acid in water.

X has charge while benzoic acid has no charge. As water is polar, charged substance X, is more soluble in water.

- (v) Describe briefly how a dry benzoic acid sample can be obtained after Step 2.

Put the benzoic acid into dessicator.

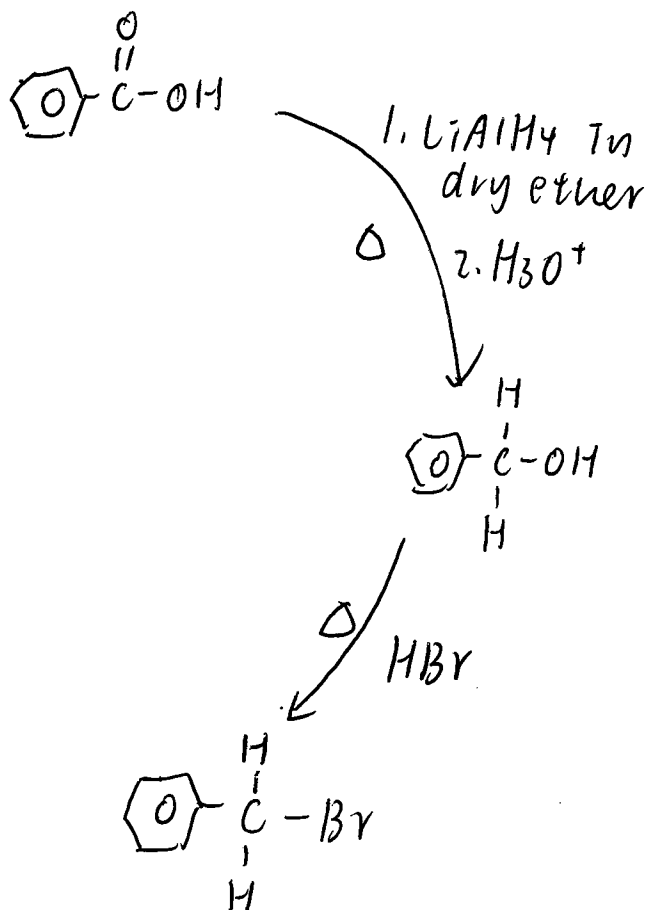
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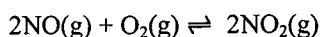
12. (b) Outline a synthetic route, with no more than three steps, to accomplish the conversion of benzoic acid to benzyl bromide. For each step, give the reagent(s), reaction conditions (as appropriate) and structure of the organic product.



(3 marks)

Answers written in the margins will not be marked.

13. Consider the reaction represented by the equation below:



- (a) In an experiment, 1.02 mol of $\text{NO}(\text{g})$ and 1.29 mol of $\text{O}_2(\text{g})$ are mixed in a 50.0 dm^3 closed container maintained at 980 K. When equilibrium is attained, 61.0% of $\text{NO}(\text{g})$ is consumed.

- (i) Calculate the equilibrium constant K_c for the above reaction under the experimental conditions.

conc. at equilibrium condition:

$\text{NO}_2(\text{g})$	$\text{O}_2(\text{g})$	$\text{NO}_2(\text{g})$
$\frac{1.02 \times 0.39}{50}$	$\frac{1.29 - \frac{0.6222}{2}}{50}$	$\frac{0.6222}{50}$
$= 7.956 \times 10^{-3} \text{ mol dm}^{-3}$	$= 0.019578 \text{ mol dm}^{-3}$	$= 0.012444 \text{ mol dm}^{-3}$

$$K_c = \frac{(0.012444)^2}{(7.956 \times 10^{-3})^2 (0.019578)}$$

$$= 124.9574 \text{ mol}^{-1} \text{ dm}^3$$

- (ii) Discuss whether K_c would change if additional $\text{NO}(\text{g})$ is introduced into the above equilibrium mixture.

No. K_c will only change if there is change in temperature of the system.

(4 marks)

- (b) The values of K_c (in appropriate unit) for this reaction at different temperatures are shown below:

Temperature / K	600	700	800	900
K_c	6.88×10^6	2.97×10^5	2.89×10^3	4.68×10^2

Based on the above data, deduce whether the forward reaction is exothermic or endothermic.

the reaction is exothermic.

(1 mark)

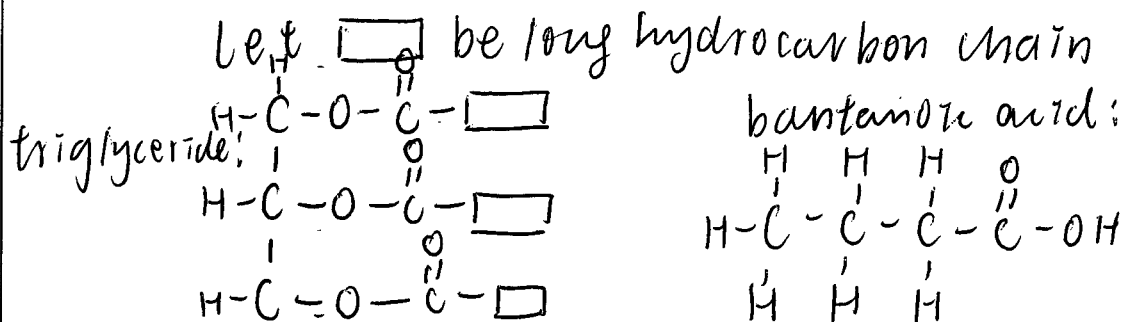
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14. Butter contains a small amount of the triglyceride of butanoic acid.

- (a) Draw the structure of the triglyceride of butanoic acid.



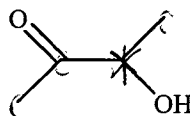
(1 mark)

- (b) An organic acid Q is an isomer of butanoic acid. State the systematic name of Q.

2-methylpropanoic acid

(1 mark)

- (c) The structure of Z, another isomer of butanoic acid, is shown below:



Z

- (i) Using '*', label ALL chiral centre(s) in the above structure of Z.
- (ii) Suggest a chemical test to show how to distinguish between Q and Z.

heat Q and Z with $\text{K}_2\text{Cr}_2\text{O}_7$
In reflux separately.

The mixture with Z change
from orange to green while
mixture with Q remains orange, (3 marks)

- (d) Margarine, a butter substitute, can be made from vegetable oils. What chemical reaction is involved in the production of margarine from vegetable oils?

Catalytic hydrogenation.

(1 mark)

END OF SECTION B

END OF PAPER

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

GROUP 族

atomic number 原子序

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)

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2014 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

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.												
1	2	3	4	5	6	7	8	9	10	11	12	
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13	14	15	16	17	18	19	20	21	22	23	24	≥25

Level 5 Exemplar & Comments

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.

試題編號 Question No.	各頁積分 Marks	積分 Marks	積分 Marks
1	+ + =		
3	+ + =		
	+ + =		
	+ + =		
	+ + =		
	+ + =		
	+ + =		
	+ + =		
總分 Total			

由核分員填寫 Checker's Use Only
核分員編號 Checker No.
總分 Total



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

寫於邊界以外的答案，將不予評閱。
Answers written in the margins will not be marked.

(1ai) Activation energy means the amount of energy needed to supply to a system to start the reaction.

(1aii) yeast acts as catalyst.
As the yeast dies in high temperature, the catalytic function fail at high temperature.

(1aiii) The ~~the~~ synthesized vitamin C can be used to produce nutrient supplement, for people who need extra vitamin C in diet or for those who don't eat fruit frequently.

(1aiv) ~~the~~ chlorine.
Sodium hydroxide.

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

(1b i) Initial rate means the rate of the reaction at the start of the reaction.

(1b ii) As I_2 has brown colour, the formation of I_2 can be followed by a colourimeter. The more the I_2 formed, the absorbance of the mixture is higher. The concentration of I_2 can be followed by a calibration graph done before the experiment.

(1b iii) Joining the points on the graph, we can draw a straight line.
Then,
$$\text{Slope} = \frac{\text{rate}}{[BrO_3^- (aq)]} = \text{constant.}$$

$\therefore$ The order of reaction with respect to $BrO_3^- (aq)$ is 1.

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每題另起新頁作答。

Start each question on a new page.

(1biv) For Trial 1:

$$2.30 \times 10^{-3} = k[0.17][0.15][0.1]^y, \text{---} \textcircled{1}$$

where y is the order of reaction
with respect to $H^+(aq)$

For trial 2:

$$1.84 \times 10^{-2} = k[0.17][0.3][0.2]^y \text{---} \textcircled{2}$$

$$\textcircled{1} \quad \frac{2.30 \times 10^{-3}}{1.84 \times 10^{-2}} = \frac{(0.15)(0.1)^y}{(0.3)(0.2)^y}$$

$$\textcircled{2} \quad \frac{1.84 \times 10^{-2}}{1.84 \times 10^{-2}} = \frac{(0.3)(0.2)^y}{(0.3)(0.2)^y}$$

$$\left(\frac{1}{4}\right) = \left(\frac{1}{2}\right)^y$$

$$y = 2.$$

∴ The order of reaction with
respect to $H^+(aq)$ is 2.

In

(1ci) Haber process, ammonia, which
is used as the raw material
for fertilizer is produced. Therefore,
Haber Process is important for
food supply in the world.

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

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Answers written in the margins will not be marked.

(1cii) It needs methane, for steam-methane reforming to produce hydrogen, the ~~raw~~ raw material for Haber Process, which exist in natural gas,

(1ciii) It is increase its surface area so that more reactants can adhere on it.

(1civ) The percentage yield.
The rate of reaction.

(1cv) The unconsumed nitrogen in the reaction is recycled.

(1cvi) It face a loss in revenue from the export of nitrate.

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每題另起新頁作答。

Start each question on a new page.

(3ai)(i) Put the sample of HCl(g) together with $\text{NH}_3(\text{g})$.
A white fume given out indicates the presence of HCl(g) .

(3ai)(ii) Add 2,4-dinitrophenylhydrazine to the sample.
The formation of a yellow-orange precipitate indicates the presence of -C=O functional group.

(3bi) This is to drive to $\text{CO}_2(\text{g})$ out from the reaction mixture.

(3bii)

(i) When there is no more colourless bubbles given out.

(ii) A brown precipitate is formed.

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

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(3 b iii) number of mole of CaCl_2O_4 :

$$\frac{2.374}{(40.1 + 12.0 \times 2 + 16.0 \times 4)} = 0.01853 \text{ mol.}$$
 $\therefore$ There is 0.01853 mol Ca^{2+} in the solution.

$\therefore$ Mass of CaCO_3 in limestone:

$$0.01853 \times (40.1 + 12.0 + 16.0 \times 3)$$

$$= 1.8548 \text{ g.}$$

$\therefore$ The percentage of CaCO_3 by mass in the limestone sample:

$$\frac{1.8548}{2.025} \times 100\%$$

$$= 91.5951\%$$

$$= 91.6\%$$

(3 b iv) Galvanizing method.

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每題另起新頁作答。

Start each question on a new page.

(3 ci) T is more soluble in pentane ~~to~~ and the acid react with NaHCO_3 aq, hence, the acid is more soluble in NaHCO_3 aq.

Pour the sample T to ~~to~~ pentane.
Then pour the T-pentane mixture and NaHCO_3 aq to a Separating funnel.
Stopper the Separating funnel and shake it. Remove the bottom NaHCO_3 aq layer, upper.
Get the pentane and evaporate the pentane.
Then dry the sample using a ~~class~~ dessicator to get pure sample T.

(3 cii)

T may have $\text{-}\overset{\text{O}}{\underset{\text{O}}{\text{C}}}\text{-}$ functional group.

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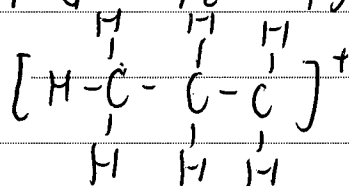
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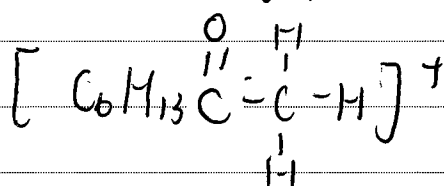
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(16)

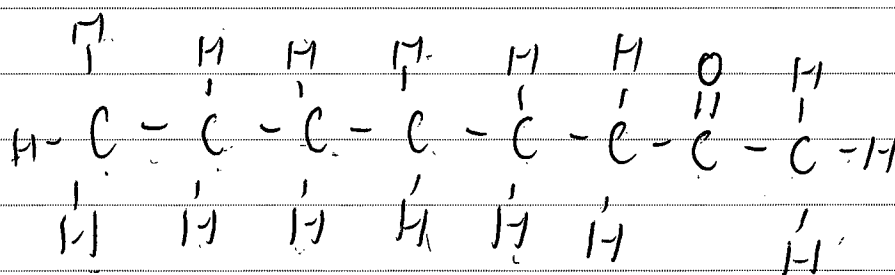
(3ciii) A† m/z = 43.



A† m/z = 134.



(3civ)



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Answers written in the margins will not be marked.

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Comments

The candidate's answers show clear understanding of the chemical concepts and principles in the curriculum (e.g. Paper 2 Q.1 (c)). He/she demonstrates very good abilities of applying chemical concepts on unfamiliar situations for solving the problems (e.g. Paper 2 Q.1 (b) (iii)). The candidate performs well on chemical calculations (e.g. Paper 1 Qs.7 and 13 (a) (i)). He/she can effectively communicate ideas using scientific terminology, appropriate diagrams and chemical equations (e.g. Paper 1 Qs.1 (a) (iii) and 12). His/her presentation of ideas in the essay questions (e.g. Paper 1 Qs.4 and 10) demonstrates proficiency in the language used and a smooth flow of ideas.