



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL
2025 SUPPLEMENTARY SESSION**

SUBJECT: **Chemistry**
 PAPER NUMBER: I – Level 1-2-3
 DATE: 28th August 2025
 DURATION: 2 hours 5 minutes

Useful data:

Avogadro constant = 6.02×10^{23}

Specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$

The molar volume for gases = 22.4 dm^3 at STP

STP conditions = $0 \text{ }^\circ\text{C}$ and 10^5 Pa /1 atm.

Directions to Candidates

- Write your index number in the space at the top left-hand corner of this page.
- Answer **ALL** questions in the spaces provided in this booklet.
- The mark allocation is indicated at the end of each question. Marks allocated to parts of questions are also indicated in brackets.
- You are reminded of the necessity for orderly presentation in your answers.
- In calculations you are advised to show all the steps in your working, giving your answer at each stage.
- The use of electronic calculators is permitted.
- The following information is printed on the back of this booklet:
 - Periodic Table
 - Reactivity Series
 - Order of discharge at electrodes
 - List of polyatomic ions and their charges
 - Solubility rules

For examiners' use only:

Question	1	2	3	4	5	6	7	8	9	10	11	Total
Score												
Maximum	7	4	13	7	4	10	8	15	14	8	10	100

Answer ALL questions.

1. In a laboratory session a group of students are asked to use hydrogen peroxide and manganese(IV) oxide to prepare oxygen gas and to collect a sample of it. They are supplied with the following laboratory apparatus:

flat-bottomed flask	dropping funnel	rubber delivery tube
rubber bung with holes	gas jar and beehive shelf	trough filled with water

- a. Complete the following word equation for the decomposition of hydrogen peroxide.

hydrogen peroxide → _____ + _____ (2)

- b. Draw a labelled diagram showing how the given apparatus is set up to produce and to collect oxygen gas.

(3)

- c. Identify the function of manganese(IV) oxide in this chemical reaction.

_____ (1)

- d. Evaluate why oxygen can be collected over water.

 _____ (1)

(Total: 7 marks)

2. Sea water can enter salt pans through planned passages and during rough weather. Describe how salt crystals are formed in the salt pans.

(Total: 4 marks)

3. Lead(II) sulfate is insoluble in water. It may be prepared by reacting lead(II) nitrate, $Pb(NO_3)_2$ and sodium sulfate, Na_2SO_4 together.
- a. Give a balanced chemical equation for the reaction, including state symbols.

_____ (3)

- b. Label the diagram in Figure 1 which shows the apparatus that is used in this experiment. (5)

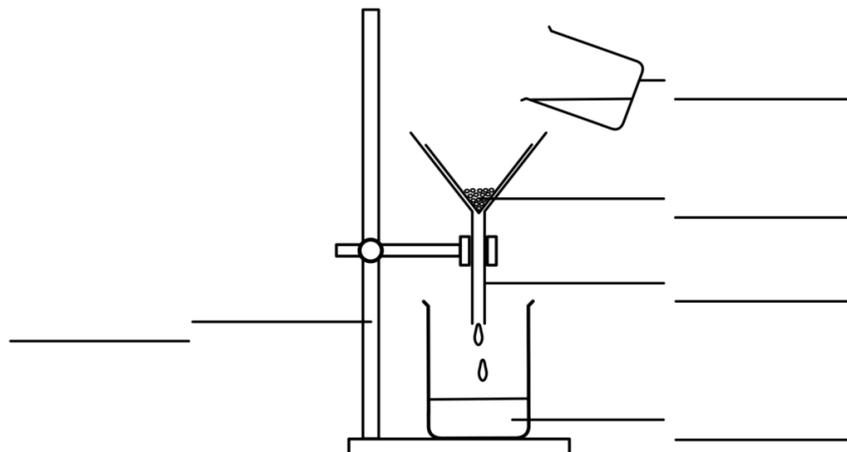


Figure 1: Adapted from dsvp.mt/subjects/chemistry/chemistry-resources

- c. Describe how lead(II) sulfate may be prepared to collect a pure dry sample.

_____ (5)

(Total: 13 marks)

4. This question investigates the electrolysis of concentrated sodium chloride solution (brine) as shown in Figure 2.

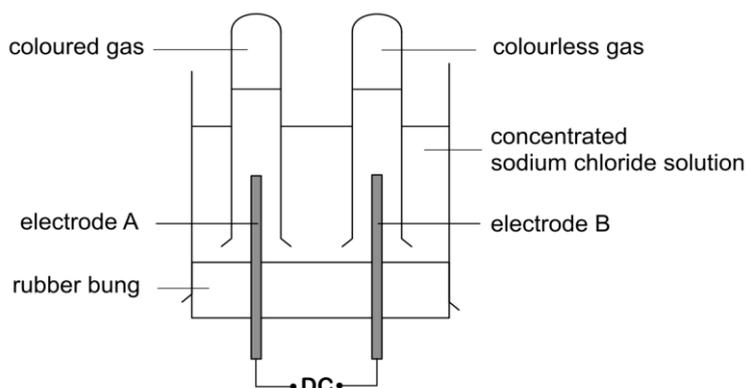


Figure 2: Adapted from dsvp.mt/subjects/chemistry/chemistry-resources

- a. Give **ONE** suitable material for electrodes A and B.

_____ (1)

b. During the experiment a coloured gas is observed bubbling around electrode A and a colourless gas bubbling around electrode B.

i. Explain what is happening at electrode A by giving its polarity and naming the gas produced.

_____ (2)

ii. Describe a simple test to confirm the identity of the gas produced in part (b)(i).

_____ (2)

iii. Give a balanced half equation for the reaction at electrode A.

_____ (2)

(Total: 7 marks)

5. Some metals are more reactive than others and this may be determined by various reactions in the laboratory.

a. Table 1 shows the results obtained when zinc, copper, and magnesium metals are mixed with different solutions as indicated.

Table 1

	zinc rod	copper rod	magnesium ribbon
zinc sulfate solution	no reaction	no reaction	reacts
copper(II) nitrate solution	reacts	no reaction	reacts
magnesium chloride solution	no reaction	no reaction	no reaction

Use the information given in Table 1 to determine the order of reactivity of the three metals starting with the most reactive metal.

_____ (2)

b. Complete the following word equation:

zinc + copper(II) nitrate → _____ + _____ (2)

(Total: 4 marks)

6. A group of students are given (i) some red coloured sweets dissolved in a small amount of distilled water, (ii) a small bottle of cola and (iii) some green colour used to make candy floss.

a. Describe how a chromatography experiment can be performed. Use ethanol as the solvent.

 _____ (4)

b. Interpret the chromatogram in Figure 3 by answering the following questions.

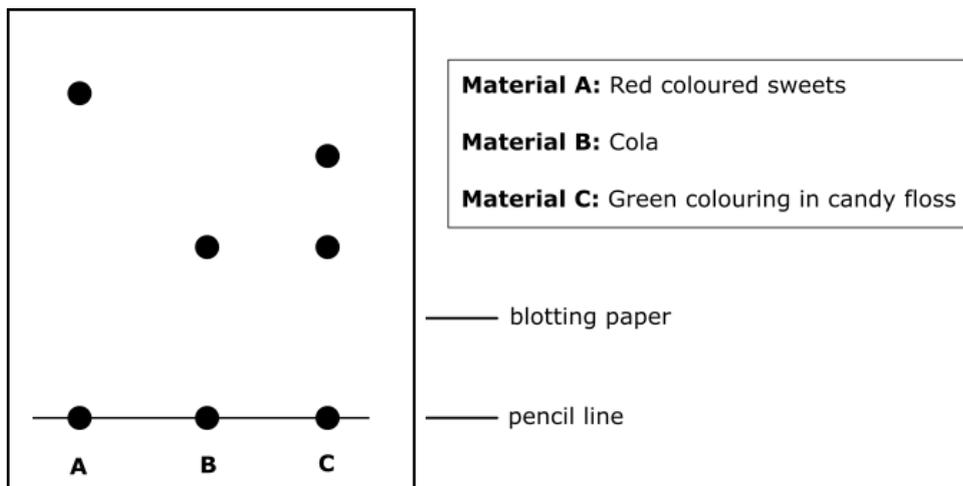


Figure 3: Chromatogram obtained by the students.

i. State which material/s contain/s only **ONE** kind of substance.

_____ (2)

ii. State which material/s contain/s more than **ONE** substance.

_____ (1)

iii. State which materials contain a substance which probably is the same in both.

_____ (2)

c. State why blotting paper is used instead of normal paper.

_____ (1)

(Total: 10 marks)

7. This question is about changes of state.

a. Complete Table 2 by stating the name of **each** of the two processes. (2)

Table 2

Description of observations	Name of process
A substance goes from the solid state to the vapour state without passing through the liquid state.	
A substance goes from the liquid state to the vapour state.	

This question continues on next page.

b. Figure 4 shows the graph of temperature against time for a cooling curve.

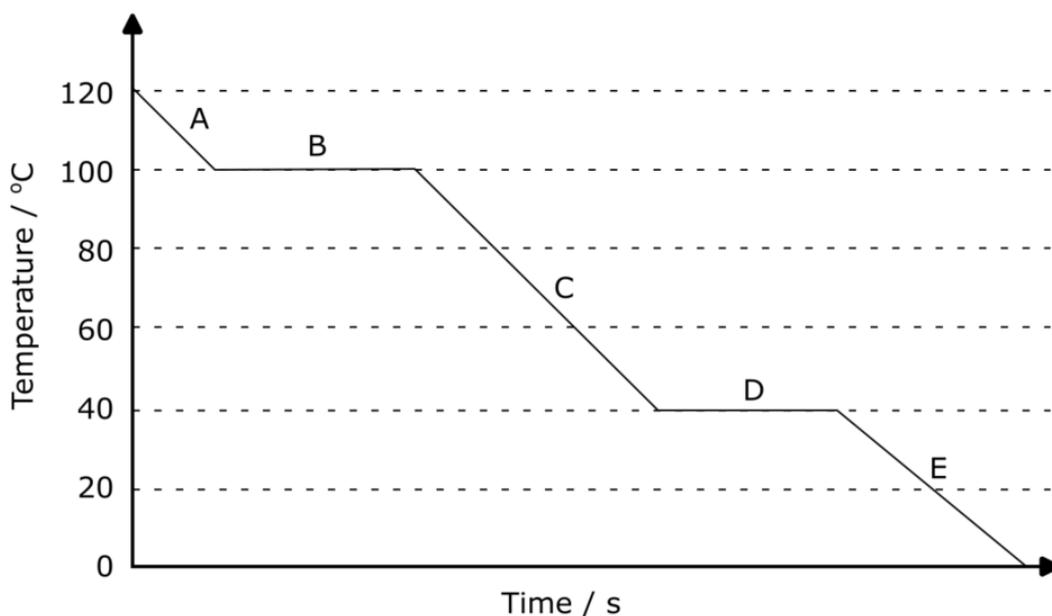


Figure 4: Adapted from dsvp.mt/subjects/chemistry/chemistry-resources

i. Interpret the shape of the cooling curve during stages A to C.

(3)

ii. Name the changes of state labelled B and D.

(2)

iii. From the graph, read the temperature for the change of state labelled D.

(1)

(Total: 8 marks)

8. This question is about finding the value of x in $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$.

a. Describe the method used to perform an experiment that may be carried out to calculate the value of x in $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$.

(5)

- b. Draw a labelled diagram to show how the apparatus is set up for this experiment.

(3)

- c. In the experiment in part (a) 2.495 g of hydrated copper(II) sulfate crystals are used. The solid remaining inside the container weighs 1.595 g.
- i. Calculate the number of moles of anhydrous copper(II) sulfate remaining, given that the relative formula mass of anhydrous copper(II) sulfate is 159.5.

(2)

- ii. Calculate the mass of water removed. _____ (1)

- iii. Calculate the number of moles of water formed in part (c)(ii), given that the relative molecular mass of water is 18.

(2)

- iv. Use the answers to parts (c)(i) and (c)(iii) to calculate the value of x in $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$.

(2)

(Total: 15 marks)

9. A reaction starts when hydrochloric acid is added to a solution of sodium thiosulfate. The mixture turns cloudy as time passes.

- a. Complete the word equation to name the substance that turns the solution cloudy. (1)

sodium thiosulfate + hydrochloric acid \rightarrow sodium chloride + water + sulfur dioxide + _____

- b. The above reaction can be used to investigate how the rate of reaction changes with temperature. The method used is as follows:

1. 50 cm³ sample of a sodium thiosulfate solution is heated in a conical flask and placed on a white paper marked with a cross.
2. 5 cm³ of dilute hydrochloric acid is added to the conical flask.
3. The time for the cross to disappear is recorded.
4. This experiment is repeated at different temperatures from 20 °C up to 60 °C.

- i. Draw a labelled diagram to show how the apparatus is set up for the experiment described above.

(4)

- ii. State why the acid and thiosulfate used have the same volume and concentration when the experiment is repeated at different temperatures.

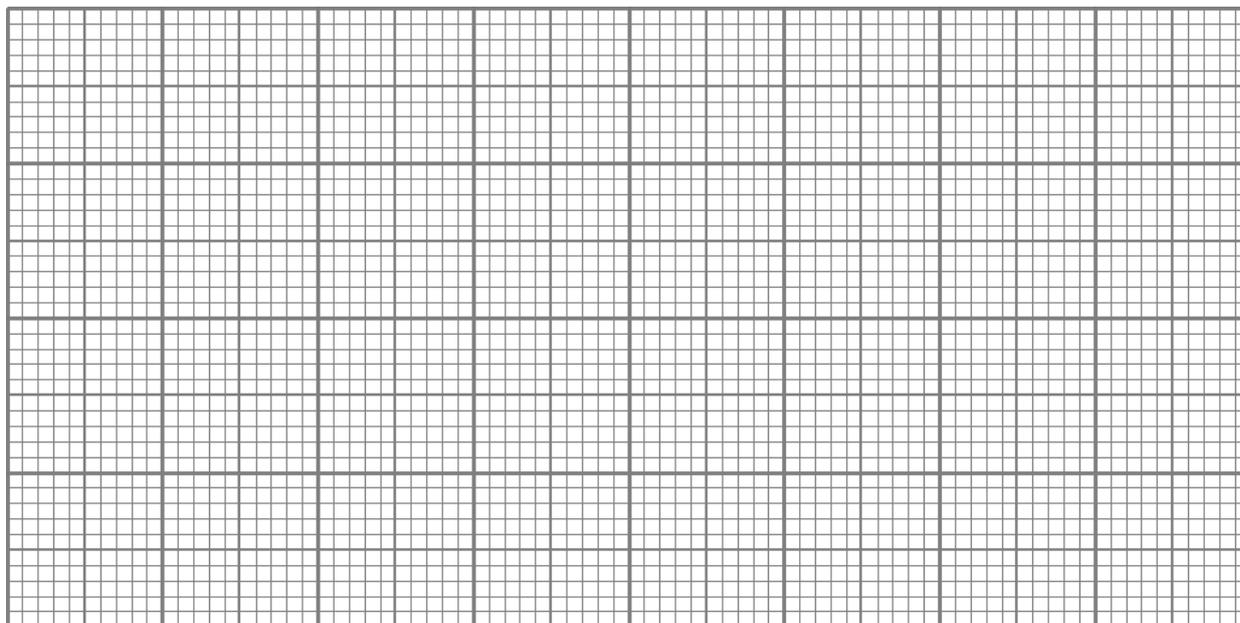
(1)

- iii. The results obtained from the above experiment are listed in Table 3.

Table 3

Temperature/ °C	20	30	40	50	60
Time taken for the cross to disappear/ s	280	132	59	31	18

Plot a graph of the time taken for the cross to disappear on the y axis against temperature on the x axis on the graph paper provided below. (3)



c. Use the kinetic theory of matter to explain why the rate of reaction changes with a change in temperature.

_____ (2)

d. The experiment setup used in part (b) **cannot** be used to investigate the rate of reaction between dilute hydrochloric acid and magnesium. Give **TWO** reasons for this statement.

_____ (2)

e. Identify **ONE** other factor, apart from temperature, that can be used to change the rate of a reaction.

_____ (1)

(Total: 14 marks)

10. Oil and water are immiscible liquids.

a. Distinguish between miscible and immiscible liquids.

_____ (1)

b. The setup in Figure 5 is used to separate an oil and water mixture. Name labels A to D in the diagram.

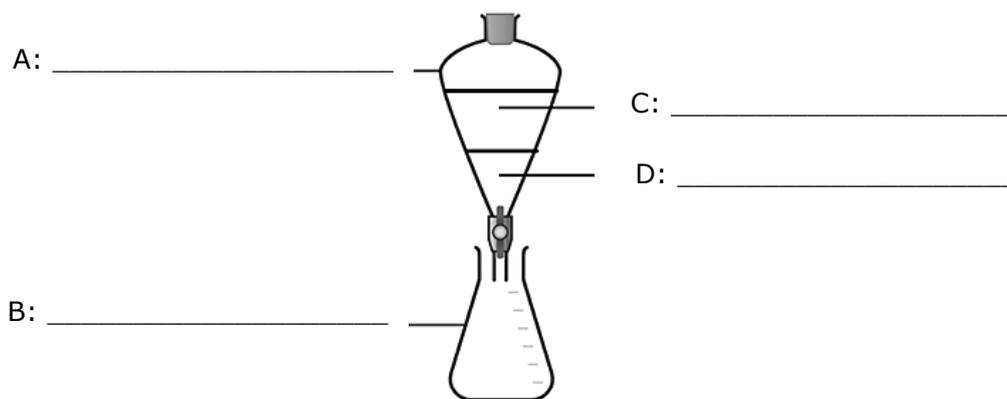


Figure 5

c. In this experiment, three separate pieces of the apparatus labelled B are required for good separation of the immiscible liquids C and D. Specify the contents collected in each apparatus. (4)

 _____ (3)

(Total: 8 marks)

11. An experiment is carried out to determine the heat of neutralisation.

a. Define heat of neutralisation.

_____ (1)

b. The procedure used during this experiment follows:

1. 20.0 cm³ of 2 mol dm⁻³ hydrochloric acid are pipetted into a container and its temperature is recorded.
2. 20.0 cm³ of 2 mol dm⁻³ sodium hydroxide solution, whose temperature is recorded, is pipetted rapidly into the acid.
3. The mixture is stirred, and the maximum temperature is recorded.

i. Identify the apparatus used to transfer both solutions to the container.

_____ (1)

ii. Give a suitable container that can be used in this experiment and explain your choice.

_____ (2)

iii. State **TWO** reasons to explain why it is necessary to stir the solutions well while measuring the temperature.

_____ (2)

c. The results from the experiment above are listed in the box below.

Results:

initial acid temperature = 15.0 °C

initial alkali temperature = 15.4 °C

maximum final temperature = 28.2 °C

Calculate the change in temperature in this experiment.

_____ (2)

d. State whether the reaction between hydrochloric acid and sodium hydroxide solution is exothermic or endothermic. Give a reason using the result to part (c).

_____ (2)

(Total: 10 marks)

PERIODIC TABLE OF THE ELEMENTS

1	2	3	4	5	6	7	0														
7 Li Lithium 3	9 Be Beryllium 4	11 Na Sodium 11	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18												
19 K Potassium 19	20 Ca Calcium 20	23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18												
37 Rb Rubidium 37	38 Sr Strontium 38	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36		
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	127 I Iodine 53	131 Xe Xenon 54	133 Cs Caesium 55	137 Ba Barium 56	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	222 Rn Radon 86					

1 H Hydrogen 1

relative atomic mass

a	X	y	b
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Key:

SYMBOL
Name
atomic number

Reactivity series	
 Decreasing Reactivity	Potassium
	Sodium
	Calcium
	Magnesium
	Aluminium
	Carbon
	Zinc
	Iron
	Lead
	Hydrogen
	Copper
	Silver
	Gold
	Platinum

Order of discharge at cathode	
 Increasing Ease of Discharge	Na ⁺
	Mg ²⁺
	Al ³⁺
	Zn ²⁺
	Fe ²⁺
	Pb ²⁺
	H ⁺
	Cu ²⁺
	Ag ⁺

Order of discharge at anode
1. For aqueous very dilute solutions OH ⁻ is discharged.
2. For aqueous concentrated solutions containing halide ions (Cl ⁻ , Br ⁻ and I ⁻), these are discharged in preference to OH ⁻ .
3. SO ₄ ²⁻ , NO ₃ ⁻ and CO ₃ ²⁻ are never discharged from aqueous solutions.

List of polyatomic ions and their charges.	
Name	Formula
Ammonium	NH ₄ ⁺
Nitrate	NO ₃ ⁻
Sulfate	SO ₄ ²⁻
Carbonate	CO ₃ ²⁻
Hydrogencarbonate	HCO ₃ ⁻
Hydroxide	OH ⁻

Solubility rules	
Soluble	Insoluble
<ul style="list-style-type: none"> All nitrates. All hydrogencarbonates. All group 1 metal salts. All ammonium salts. Halides except silver and lead halides. Sulfates except barium, calcium, and lead sulfates. 	<ul style="list-style-type: none"> Carbonates except group 1 metal and ammonium carbonate. Metal oxides except group 1 and 2 metal oxides that react with water. Hydroxides except group 1 metal and ammonium hydroxides.



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**SECONDARY EDUCATION CERTIFICATE LEVEL
2025 SUPPLEMENTARY SESSION**

SUBJECT: **Chemistry**
 PAPER NUMBER: II – Level 2-3
 DATE: 28th August 2025
 DURATION: 2 hours 5 minutes

Useful data:

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Specific heat capacity of water = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$

The molar volume for gases = 22.4 dm^3 at STP

STP conditions = $0 \text{ }^\circ\text{C}$ and 10^5 Pa /1 atm.

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Score													
Maximum	7	12	11	4	9	10	12	5	7	6	12	5	100

Answer ALL questions.

1. The graph in Figure 1 shows how the yearly average amounts of black smoke and sulfur dioxide in London's air have changed over time.

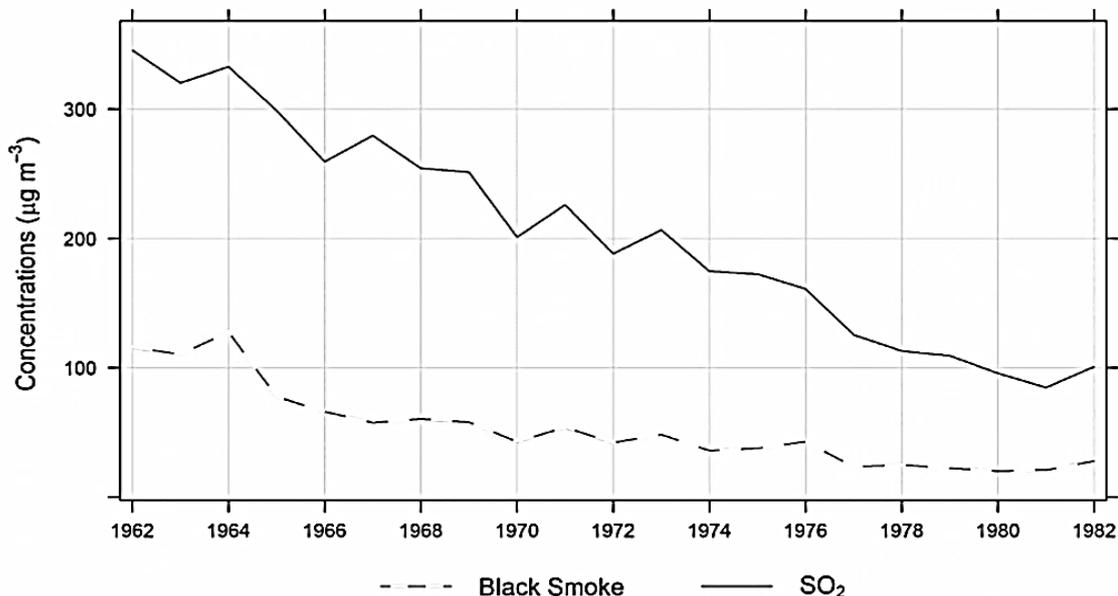


Figure 1: Adapted from: <https://www.london.gov.uk/>

- a. From the graph, find the concentration of:
- i. SO₂ in 1965: _____ (1)
 - ii. black smoke in 1971: _____ (1)
- b. Use the graph to interpret how the levels of sulfur dioxide and black smoke changed from the mid-1960s onwards.
- _____ (1)
- c. Discuss by giving **ONE** reason for the trend observed from 1962 to 1982.
- _____ (1)
- d. Explain how sulfur dioxide ends up in London's atmosphere due to human activity.
- _____ (1)
- e. Sulfur dioxide is covalently bonded. Explain how covalent bonds are formed.
- _____ (1)
- f. Identify the type of oxide that sulfur dioxide belongs to.
- _____ (1)

(Total: 7 marks)

2. The graph in Figure 2 shows the solubility curves of four solids: A, B, C, and D.

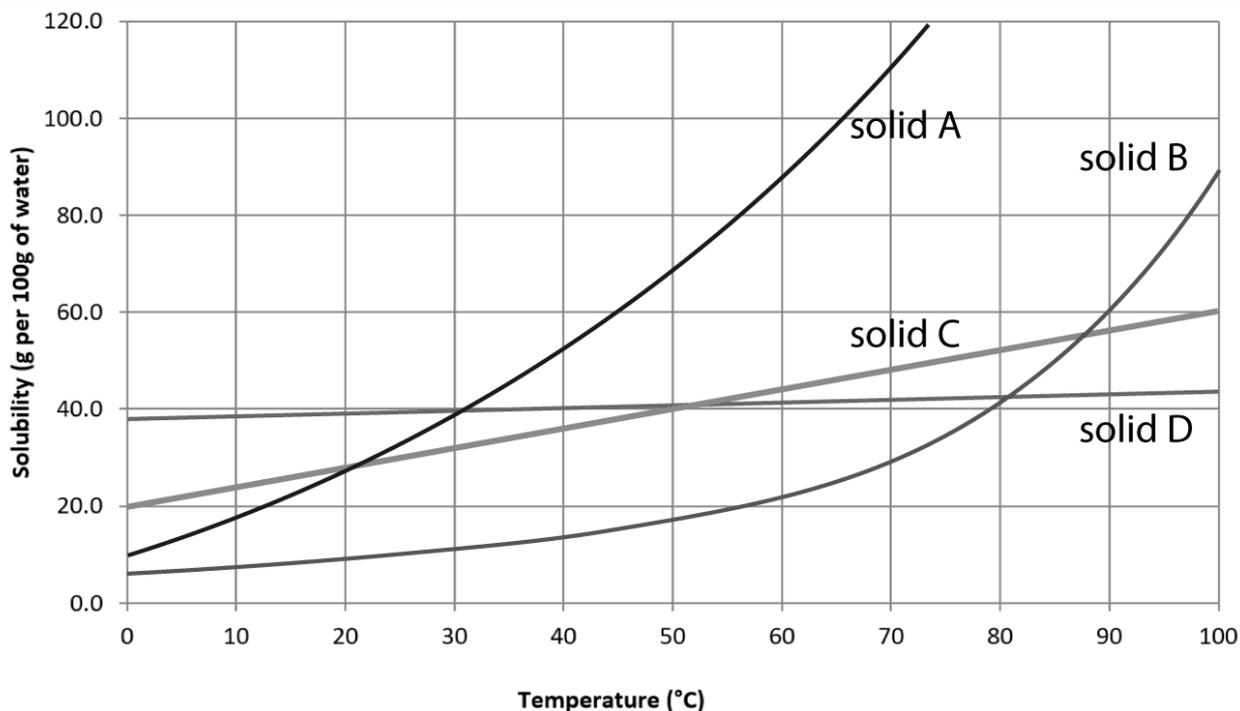


Figure 2: Adapted from https://www.gradegorilla.com/chemistry/i_EDE/Solubility/IESolubility1.php

a. Interpret the graph to:

i. Identify the most soluble solid at 50 °C.

_____ (1)

ii. Give the solubility of solid D at 40 °C.

_____ (2)

iii. State what happens if a solution of solid B is cooled from 90 °C to 20 °C.

_____ (1)

b. Solid A is an ionic compound. Explain this statement with reference to its properties shown in Figure 2.

 _____ (1)

c. All the values plotted on the graph are saturated solutions at a given temperature. Distinguish between a saturated solution and a dilute solution.

 _____ (1)

This question continues on next page.

- d. Solid D is sodium chloride. Draw a dot and cross diagram to show the bonding in this substance. Show **all** electron shells.

(3)

- e. Use the solubility rules to predict whether the following statements are true (T) or false (F):

- Solid A is potassium nitrate: _____ (1)
- Solid B is calcium carbonate: _____ (1)
- Solid C is potassium chloride: _____ (1)

(Total: 12 marks)

3. Some students react different copper compounds with hydrochloric acid. The results are summarised in Table 1.

Table 1

Substance tested	Colour	Observation after acid is added
Copper(II) carbonate	Green	Reacts with effervescence and gives a blue solution.
Copper(II) hydroxide	Blue	Reacts to give a blue solution.
Copper(II) oxide	Black	Reacts to give a blue solution.

- a. State why effervescence is observed when copper(II) carbonate reacts with the acid.

_____ (1)

- b. Write a net ionic equation, including state symbols, for the reaction between copper(II) carbonate and hydrochloric acid.

_____ (3)

- c. State why the same blue solution is formed with each compound in Table 1.

_____ (1)

- d. The student tested an old greenish copper object with hydrochloric acid and effervescence was observed. Which compound is present on the surface of the object?

_____ (1)

- e. Write a balanced chemical equation, including state symbols, for the reaction between copper(II) oxide and hydrochloric acid.

_____ (3)

- f. Identify the type of oxide that copper(II) oxide belongs to.

_____ (1)

- g. Use the reactivity series to determine whether copper will react with hydrochloric acid.

_____ (1)

(Total: 11 marks)

4. This question is about the action of electricity on materials.

- a. Graphite is a non-metal. Explain how it conducts electricity.

_____ (2)

- b. Explain why solid lead(II) bromide does **not** conduct electricity but molten lead(II) bromide does.

_____ (2)

(Total: 4 marks)

5. A student is asked to investigate the reactivity of the halogens. Bromine water and solutions of sodium chloride and sodium iodide are provided together with all the necessary apparatus.

- a. Using the substances mentioned only, describe a simple experiment to compare the reactivity of chlorine, bromine and iodine.

_____ (1)

- b. Describe any expected observations.

_____ (2)

- c. Write a net ionic equation/s, including state symbols, for any reaction/s which occur.

_____ (3)

This question continues on next page.

d. Explain the observations in part (b).

_____ (2)

e. Construct a reactivity series of these non-metals starting with the least reactive element.

(Total: 9 marks)

6. A 25.0 cm³ sulfuric acid solution of concentration 0.2 mol dm⁻³ requires 35.0 cm³ of potassium carbonate solution for complete neutralization. During the reaction a gas is produced.

a. Write a balanced chemical equation for this reaction.

_____ (2)

b. Use your answer to part (a) to find the concentration, in mol dm⁻³, of the potassium carbonate solution.

_____ (3)

c. Calculate the mass, in grams, of solid potassium carbonate needed to prepare 1 dm³ of this solution at the concentration calculated in part (b).

_____ (2)

d. Describe what happens when the gas produced is bubbled through limewater.

_____ (1)

e. Calculate the volume of gas at STP, in dm³, that is produced during this reaction.

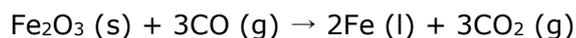
(Total: 10 marks)

7. Iron and aluminium are two metals which are often used in everyday life.

a. In industry the Blast Furnace is used to extract iron from its ore. Describe this process by naming **TWO** other substances besides haematite which are needed to produce iron.

_____ (2)

- b. The following equation shows the main reaction which occurs in the Blast Furnace.



Interpret the extraction of iron in terms of oxidation numbers.

_____ (2)

- c. Aluminium **cannot** be extracted like iron. Use the reactivity series to explain this statement.

_____ (2)

- d. Describe the conditions needed to extract aluminium from molten bauxite during electrolysis by naming a substance that is added and why it is used.

_____ (2)

- e. Use a half equation to describe how aluminium is produced in the electrolysis of bauxite.

_____ (2)

- f. In the past most doors and windows were made of iron. State **ONE** advantage and **ONE** disadvantage of using iron instead of aluminium in the manufacture of doors and windows.

Advantage: _____ (1)

Disadvantage: _____ (1)

(Total: 12 marks)

8. When calcium carbonate is heated strongly a chemical reaction occurs.

- a. Classify this type of reaction.

_____ (1)

- b. Write a balanced chemical equation for this reaction.

_____ (2)

- c. In an experiment 50.0 g of calcium carbonate produced 28.0 g of solid product.

- i. Calculate the mass of the other product.

_____ (1)

- ii. Explain your reasoning.

_____ (1)

(Total: 5 marks)

9. A group of students are asked to investigate the rate of reaction when the surface area of a reactant is changed.

They are given 50.0 cm³ of dilute hydrochloric acid and two samples of magnesium carbonate each weighing 45.0 g. One of the samples is in powder form while the other is in the form of granules. The students are provided with all the necessary laboratory equipment including a gas syringe and a stopwatch.

- a. Describe an investigation to show how surface area affects the rate of reaction using the materials and equipment mentioned above.

(4)

- b. The students then plotted a graph with the results obtained as shown in Figure 3.

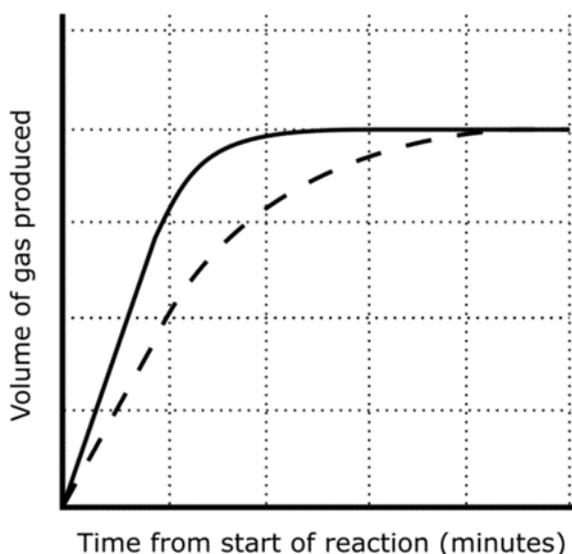


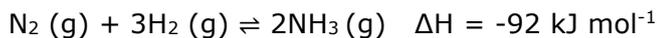
Figure 3

Interpret the graph in Figure 3 by placing an X next to the graph which was obtained when using powdered magnesium carbonate. Explain your choice.

(3)

(Total: 7 marks)

10. The Haber Process is an industrial method used to produce ammonia. The following reaction occurs in the reaction chamber.



a. Explain why the reaction is carried out in a closed container.

_____ (1)

b. Explain how the best yield of ammonia is obtained with respect to the following conditions:

i. Temperature of 450 °C.

 _____ (2)

ii. Pressure of 200 atmospheres.

 _____ (2)

c. Give **ONE** use of ammonia.

_____ (1)

(Total: 6 marks)

11. Ethanol can be produced using two processes, either fermentation of glucose or hydration of ethene.

a. Describe **both** processes. In your answer state the conditions required during each process. **No** equations are required.

 _____ (5)

b. Give **ONE** advantage and **ONE** disadvantage of producing ethanol by fermentation of glucose when compared to hydration of ethene.

Advantage: _____ (1)

Disadvantage: _____ (1)

- c. In industry ethene is produced by thermal cracking of long chain alkanes.
i. Describe how this process produces ethene.

_____ (1)

- ii. Identify the substances that form when $C_{10}H_{22}$ is thermally cracked.

_____ (2)

- iii. Describe how the use of fossil fuels contributes to pollution.

_____ (2)

(Total: 12 marks)

12. The heat of combustion of hydrogen is $-241.8 \text{ kJ mol}^{-1}$.

- a. Define the term 'heat of combustion'.

_____ (1)

- b. What is the significance of the negative sign (-) in front of the numerical value?

_____ (1)

- c. Calculate the heat energy produced when a mass of 180 g of hydrogen gas is completely burnt in oxygen.

_____ (3)

(Total: 5 marks)

PERIODIC TABLE OF THE ELEMENTS

1	2	3	4	5	6	7	0												
7 Li Lithium 3	9 Be Beryllium 4	11 Na Sodium 11	12 Mg Magnesium 12	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18										
19 K Potassium 19	20 Ca Calcium 20	21 Sc Scandium 21	22 Ti Titanium 22	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36		
37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Zr Zirconium 40	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54		
55 Cs Caesium 55	56 Ba Barium 56	57 La Lanthanum 57	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86		
																		20 Ne Neon 10	40 He Helium 2

1 H Hydrogen 1

relative atomic mass
SYMBOL
 Name
 atomic number

a	X	y	b
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Key:

Reactivity series	
	Potassium
	Sodium
	Calcium
	Magnesium
	Aluminium
	Carbon
	Zinc
	Iron
	Lead
	Hydrogen
	Copper
	Silver
	Gold
	Platinum