education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

PHYSICAL SCIENCES: CHEMISTRY P2

SEPTEMBER 2026

MARKS: 150

TIME: 3 hours

This question paper consists of 15 pages and 4 data sheets

INSTRUCTIONS AND INFORMATION

1. Write your name in the appropriate space on the ANSWER BOOK.
2. This question paper consists of NINE questions. Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.
6. You may use a non-programmable calculator.
7. You may use appropriate mathematical instruments.
8. You are advised to use the attached DATA SHEETS.
9. Show ALL formulae and substitutions in ALL calculations.
10. Round off your final numerical answers to a MINIMUM of TWO decimal places.
11. Give brief motivations, discussions, et cetera where required.
12. Write neatly and legibly.

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QUESTION 1 : MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter (A – D) next to the question number (1.1 – 1.10) in the ANSWER BOOK, for example, 1.11 E.

1.1 Which ONE of the following compounds does NOT have the molecular formula C_4H_8O?

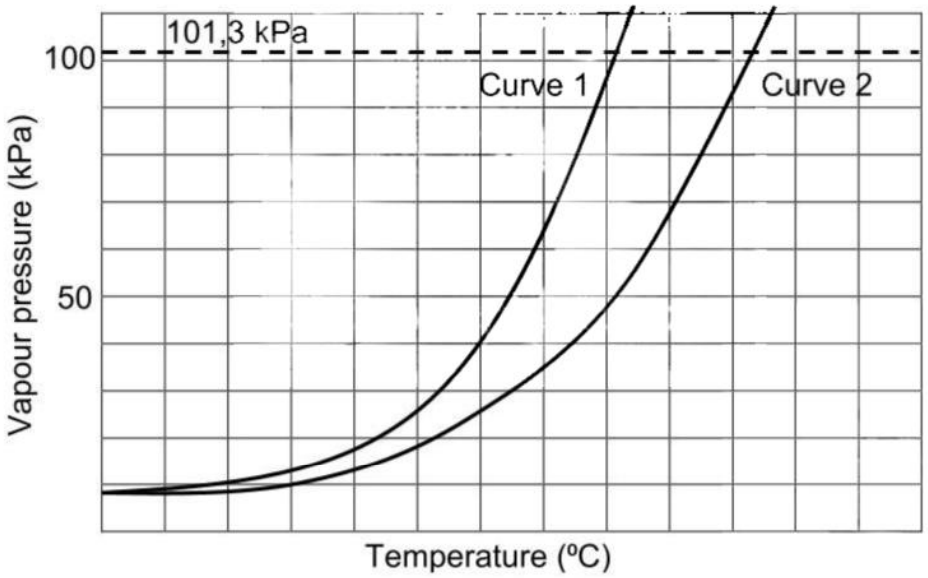
A Butanal

B Methylpropanal

C Butan-2-one

D Butan-2-ol (2)

1.2 The following graph shows the relationship between vapour pressure and temperature for two different organic compounds. The dotted line indicates the external atmospheric pressure.

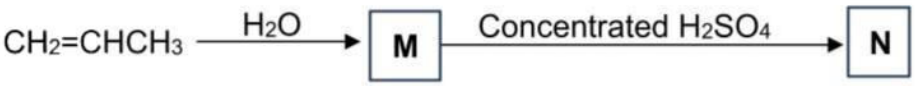


Which combinations of organic compounds are represented by CURVES 1 and 2 respectively?

	CURVE 1	CURVE 2
A	Pentane	2,2-dimethylpropane
B	Butan-1-ol	Propanoic acid
C	Butan-1-ol	Butanal
D	Hexane	Propane

(2)

1.3 In the flow diagram below, **M** and **N** represents two organic compounds.



Which ONE of the following is the CORRECT condensed structural formula for the main product of compound **N**?

A CH_2CHCH_3

B $CH_3CH_2CH_3$

C $CH_3CHBrCH_3$

D $CH_3CHOHCH_3$ (2)

1.4 The diagrams below show **A**, the Maxwell–Boltzmann distribution curve, and **B**, the energy profile graph, for the same chemical reaction.

The effect of a catalyst is shown on both graphs.

Diagram A

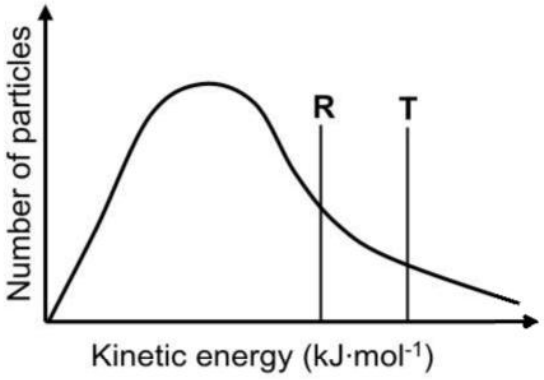
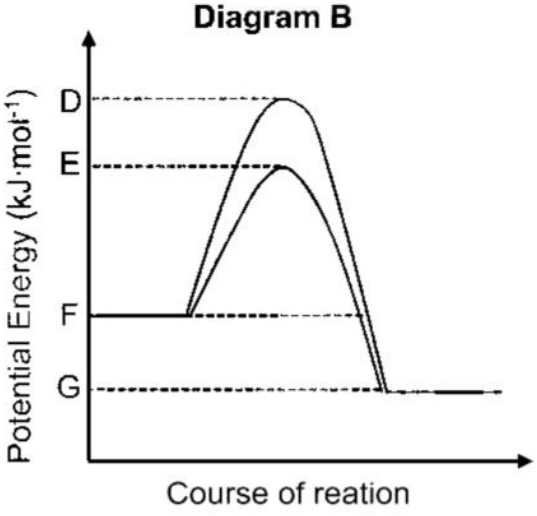


Diagram B



Which energy level in Diagram **B** corresponds to the activation energy indicated by **R** in Diagram **A**?

A D – F

B E – F

C F – G

D D – G (2)

1.5 The addition of a catalyst to a reversible reaction at equilibrium increases the ...

A Equilibrium constant of the forward reaction.

B Product produced at equilibrium

C The rate of both forward and reverse reactions

D Rate of only the forward reaction. (2)

1.6 Consider the following reaction at equilibrium in a closed container:

$$CaO(s) + SO_2(g) \rightleftharpoons CaSO_3(s)$$

If the equilibrium concentration of $SO_2(g)$ at 25 °C is x mol·dm^{-3}, the value of the equilibrium constant at this temperature is…

A x

B x^2

C $\frac{1}{x^2}$

D $\frac{1}{x}$ (2)

1.7 A 0,5 mol·dm^{-3} solution of each of the following acids is prepared. Which acid has the greatest electrical conductivity?

A H_2SO_4

B $HC\ell$

C CH_3COOH

D HNO_3 (2)

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1.8 Which ONE of the following pairs represents the conjugate acid and the conjugate base of HPO_4^{2-}?

	CONJUGATE ACID	CONJUGATE BASE
A	PO_4^{3-}	$H_2PO_4^-$
B	$H_2PO_4^-$	PO_4^{3-}
C	$H_2PO_4^-$	H_2PO_4
D	HPO_4^{2-}	PO_4^{2-}

1.9 A solution of copper(II)chloride ($CuC\ell_2$) must be stored in a metal container. Which ONE of the following metals should be used?

A Ag

B Zn

C Mg

D Fe (2)

1.10 During the electrolysis of a concentrated sodium chloride solution, water is reduced and not sodium ions because ...

A Na^+ is a stronger reducing agent than H_2O.

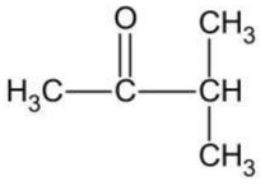
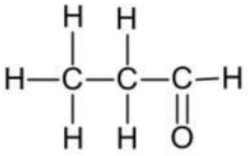
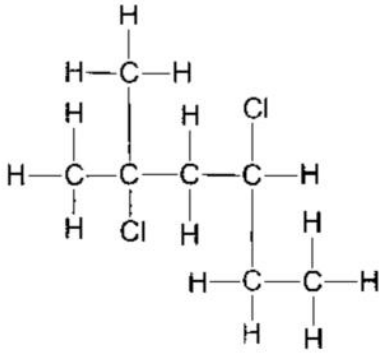
B Na^+ is a stronger oxidising agent than H_2O.

C H_2O is a stronger reducing agent than Na^+.

D H_2O is a stronger oxidising agent than Na^+. (2)
[20]

QUESTION 2 (Start on a new page)

The letters **A** to **G** in the table below represent SEVEN organic compounds.

A	CH_3CH_2COOH	**B**	
C		**D**	5-ethyl-2,3-dimethylhept-1-ene
E		**F**	Ethyl propanoate
		G	$CH_3CH(CH_3)CHOHCH_3$

2.1 Write down the LETTER(S) that represent the following:

2.1.1 A haloalkane (1)

2.1.2 A ketone (1)

2.1.3 A reactant in the preparation of compound **F** (1)

2.2 Write down the IUPAC name of:

2.2.1 Compound **B** (3)

2.2.2 Compound **E** (3)

2.3 Write down the structural formula of compound **D**. (3)

2.4 Consider compound **C**. Write down the structural formula of the:

2.4.1 Functional group. (1)

2.4.2 Functional isomer. (2)

2.5 Is compound **G** a PRIMARY, SECONDARY or TERTIARY alcohol? Give a reason for your answer. (2)

[17]

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QUESTION 3 (Start on a new page.)

3.1 Learners use pent-2-ene and 2-methylbut-2-ene to investigate the factors that influence the boiling points of organic compounds.

The results are shown in the table below:

COMPOUND	BOILINGPOINT (°C)
X	39
Y	30

3.1.1 Define the term *boiling point*. (2)

3.1.2 Which ONE of the two samples (**X** or **Y**) is pent-2-ene? (1)

3.1.3 Explain the answer to QUESTION 3.1.2. (3)

3.2 Another experiment was conducted to determine the boiling point of organic compounds from FOUR different homologous series, represented by letters **A** to **D**, under the same conditions.

The results are shown in the table below:

	COMPOUND	MOLAR MASS ($g \cdot mol^{-1}$)	BOILINGPOINT (°C)
A	$CH_3(CH_2)_2CH_3$	72	X
B	CH_3CH_2COOH	74	141,2
C	$CH_3(CH_2)_2CH_2OH$	74	117,7
D	$CH_3(CH_2)_2CHO$	72	74,8

3.2.1 What is the boiling point in °C of compound **A**? Choose from:

125	82	-0,5

(1)

Consider compounds **B**, **C** and **D**.

3.2.2 Which compound will have the lowest vapour pressure? Give a reason for the answer. (2)

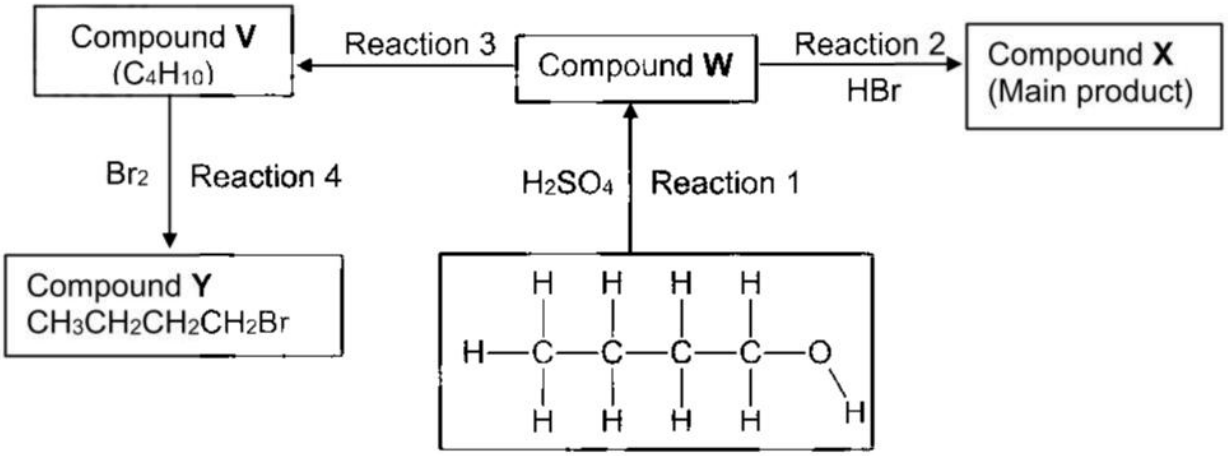
3.2.3 Write down the type of intermolecular forces that occur between the molecules of compound **D**. (1)

3.2.4 Explain the difference in boiling point between compound **B** and compound **C**. (3)

[13]

QUESTION 4 (Start on a new page.)

Study the flow diagram below that represents different organic reactions and answer the questions that follow.



4.1 Write down the type of reaction represented by **Reaction** 1 (1)

4.2 A hydrocarbon is formed during Reaction 3.

4.2.1 Is compound **V** SATURATED or UNSATURATED? (1)

4.2.2 Write down the formula of the catalyst required for this reaction. (1)

4.3 Write down the:

4.3.1 IUPAC name of compound **W**. (2)

4.3.2 Reaction condition required for Reaction 4 to take place. (1)

4.4 Reaction 2 is an addition reaction. Write down the:

4.4.1 Type of addition reaction. (1)

4.4.2 STRUCTURAL FORMULA of compound **X**. (2)

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4.5 Consider the incomplete equations for Reactions 5 and 6.

Reaction 5	$C_{16}H_{34} \rightarrow$ Alkane **P** + 2**Q** + C_xH_8
Reaction 6	$CH_3CH_2CH_2Br + KOH \rightarrow$ **Q** + KBr + **A**

In Reaction 5, compound $C_{16}H_{34}$ undergoes cracking. **Q** is an organic compound while **A** is an inorganic compound.

The compounds **Q** and C_xH_8 have the same FUNCTIONAL GROUP.

4.5.1 Write down the IUPAC name of compound **Q**. (1)

4.5.2 Write down the NAME or FORMULA of inorganic compound **A**. (1)

4.5.3 Write the balanced equation for the complete combustion of ALKANE **P**. (4)

[15]

QUESTION 5 (Start on a new page.)

In the experiments to investigate factors that influence the reaction rate, Cu reacts with excess nitric acid.

The balanced chemical equation for the reaction is given below:

$$3Cu(s) + 8HNO_3(aq) \rightarrow 3Cu(NO_3)_2(aq) + 2NO_2(g) + 4H_2O(\ell)$$

The same mass of Cu was used in all the experiments. The reaction conditions for each experiment are summarised below:

Experiment	Temperature (°C)		Concentration of HNO_3 ($mol \cdot dm^{-3}$)	State of Cu(s)
	Before	After		
A	30	48	0,8	Powder
B	30	47	0,8	Pieces
C	35	59	0,8	Pieces
D	30	55	1,6	Powder

5.1 Define the term *reaction rate*. (2)

5.2 Is the reaction above EXOTHERMIC or ENDOTHERMIC? Give a reason for the answer by referring to the data in the table. (2)

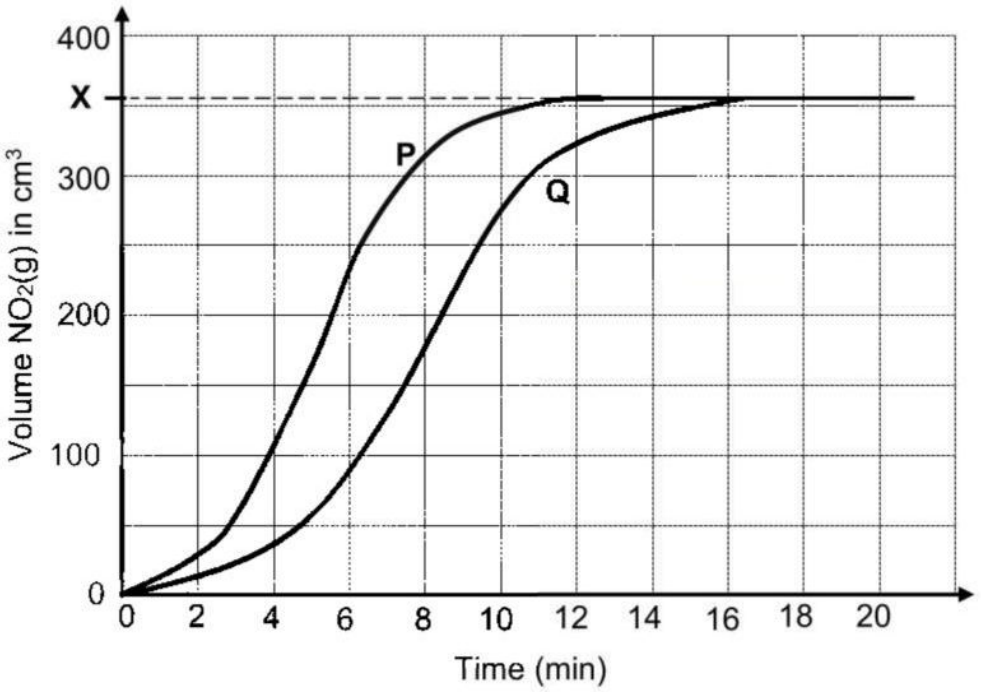
5.3 Would it be a fair comparison to compare the reaction rate of experiment **A** and **C**? Explain the answer. (2)

5.4 How does the reaction rate in Experiment **A** compare with that in Experiment **D**?

Write only HIGHER THAN, LOWER THAN or EQUAL. (1)

5.5 Explain the answer to QUESTION 5.4 by referring to the collision theory. (3)

5.6 The volume of NO_2 versus time for the reaction in Experiment **A** and **B** is shown below.



5.6.1 Which curve represents Experiment **B**? Write down only **P** or **Q**. (1)

5.6.2 Write down the dependent variable for Experiment **A**. (1)

5.6.3 Calculate the initial mass of copper used in Experiment **A**, if the average rate of the reaction in the time 0 to 12 minutes was 0,0294 $dm^3 \cdot min^{-1}$ at STP. (5)

[17]

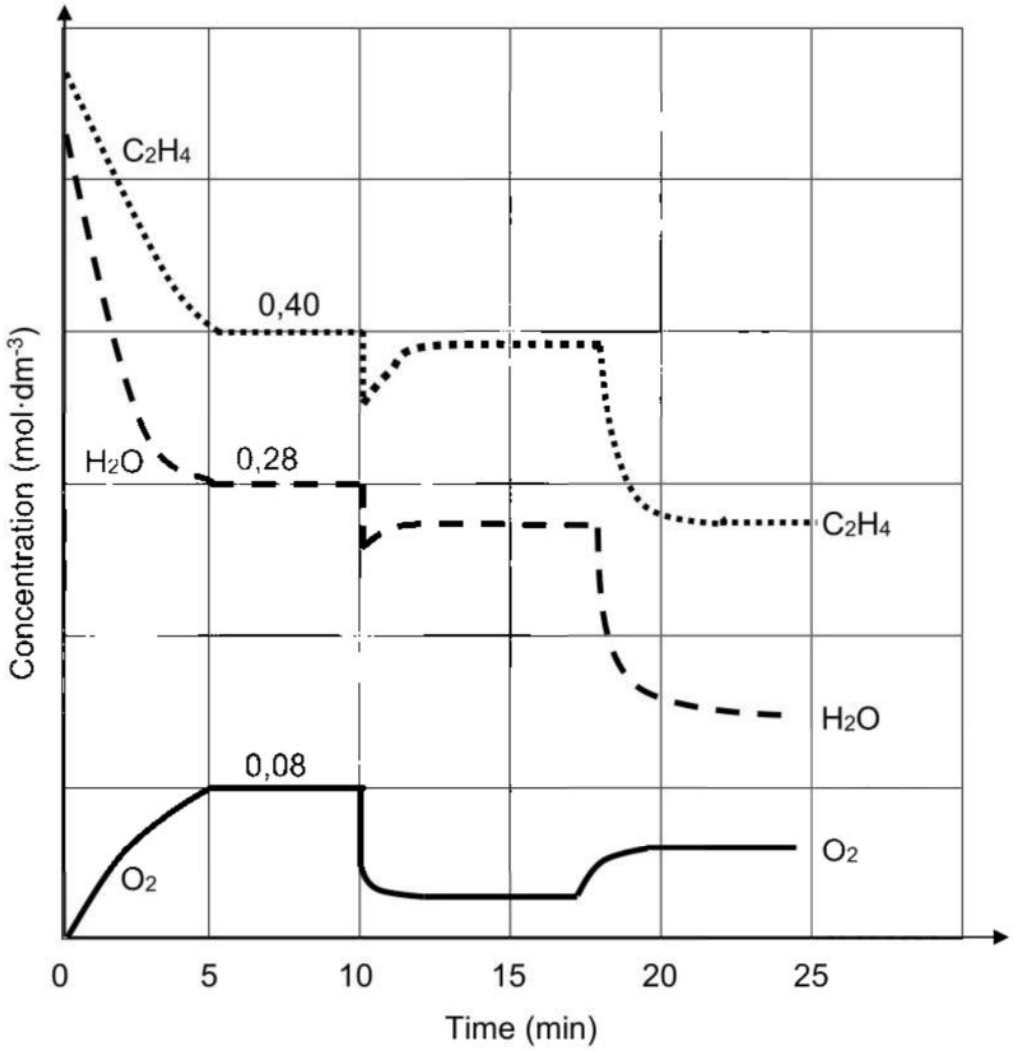
QUESTION 6 (Start on a new page)

Consider the reversible reaction of ethene with steam in the ABSENCE of an acid, as shown below:

$$2C_2H_4(g) + 2H_2O(g) \rightleftharpoons 2C_2H_6(g) + O_2(g)$$

The reaction was done in a 3 dm^3 closed container. The temperature was kept constant at T_1 for the first 18 minutes.

The graph below (NOT to scale) shows the changes in concentration of C_2H_4, H_2O and O_2 as a function of time.



6.1 State *Le Chatelier's principle*. (2)

6.2 Use *Le Chatelier's principle* to describe the change made to the system at 10 minutes. (4)

6.3 At 18 min, the temperature was INCREASED. With the use of *Le Chatelier's principle* and the graph, fully explain whether the forward reaction is ENDOTHERMIC or EXOTHERMIC. (4)

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6.4 Define the term *chemical equilibrium*. (2)

6.5 At 35 minutes, argon (an inert gas) is added to the container. What effect does this have on the amount of C_2H_6 at equilibrium? State only INCREASES, DECREASES, or NO EFFECT. (2)

6.6 N_2O_4 gas was pumped into a container until the concentration was 0,46 mol·dm^{-3}. The container was then sealed and heated to 100 °C. At equilibrium, 20,7% of the N_2O_4 gas had decomposed to NO_2 gas as shown in the reaction below.

$$N_2O_4(g) \rightleftharpoons 2NO_2(g)$$

Calculate the equilibrium constant for this reaction at 100 °C. (6)
[20]

QUESTION 7 (Start on a new page)

7.1 A learner determined the pH of three solutions at 25 °C. The learner obtained the following results:

Solution	Battery acid	Orange juice	Baking soda
pH	1	4,12	12

7.1.1 Which solution contains the highest concentration of hydrogen/ hydronium ions? (2)

7.1.2 Calculate the concentration of hydroxide ions in orange juice. (4)

7.1.3 How will the pH of battery acid change when:
(Write INCREASES, DECREASES or STAYS THE SAME.)

a) Distilled water is added (1)

b) A certain amount of the baking soda solution is added (1)

7.2 Two beakers A and B contain the acid and a strong base respectively.

Beaker A: 0,5 dm^3 of carbonic acid, $H_2CO_3(aq)$ of concentration 0,10 mol·dm^{-3}.

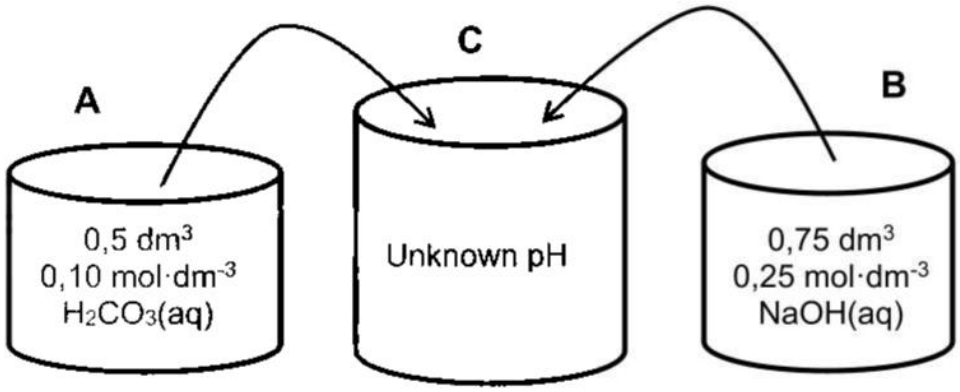
Beaker B: 0,75 dm^3 of sodium hydroxide, NaOH(aq) of concentration 0,25 mol·dm^{-3}

When a 0,10 mol·dm^{-3} solution of H_2CO_3 is prepared, it is found that the concentration of $HCO_3^-(aq)$ ions is 0,012 mol·dm^{-3} at 25 °C.

7.2.1 Calculate the number of moles of $H_3O^+(aq)$ ions present in the H_2CO_3 solution in beaker A. (3)

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The contents of beakers A and B are added together in beaker C. The solution in beaker C has an unknown pH.



The balanced equation for the reaction is:

$$H_2CO_3(aq) + NaOH(aq) \rightarrow NaHCO_3(aq) + H_2O(\ell)$$

7.2.2 Calculate the number of moles of hydroxide (OH^-) ions in beaker B. (3)

7.2.3 Calculate the pH of the solution at the completion of the reaction in beaker C. (7)

[21]

QUESTION 8 (Start on a new page)

8.1 The two half-cells, Fe(s)/ Fe^{2+}(aq), and O_2(g) /$H_2O(\ell)$ in acid solution, are used to set up an electrochemical cell.

The cell operates under standard conditions.

8.1.1 Which half-cell represents the anode? (2)

8.1.2 Write down the balanced equation for the oxidation half-reaction. (2)

8.1.3 Write down the balanced equation for the overall nett reaction. (3)

8.1.4 Calculate the emf of the cell. (4)

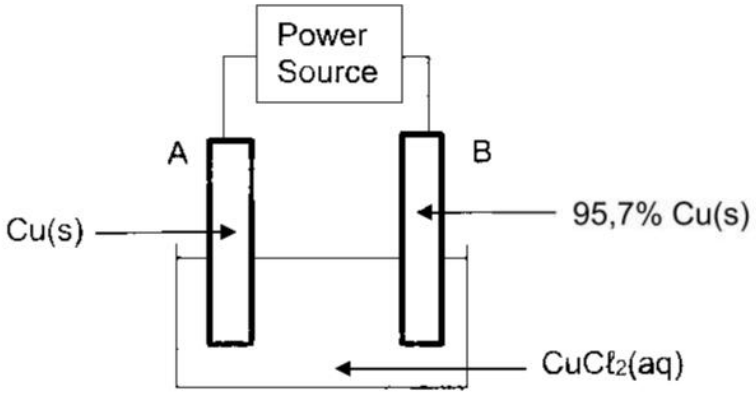
8.2 A magnesium bar is attached to a buried iron pipe. Use the Table of Standard Reduction Potentials to explain why the magnesium will be able to protect the iron from being oxidised. (3)

8.3 A strip of magnesium is lowered into a gas jar containing chlorine gas. Use the table of Standard Reduction Potentials to write down the reduction half-reaction. (2)

[16]

QUESTION 9 (Start on a new page)

The electrolytic cell, shown below is used to purify an IMPURE copper sample for use in electrical wires. Copper(II)chloride solution, $CuC\ell_2$, is used as the electrolyte. Electrode **B** contains 95,7% Cu.



9.1 Is electrode A, the POSITIVE or NEGATIVE electrode? (1)

9.2 While the cell is in operation, how will the concentration of the electrolyte change? Write down INCREASES, DECREASES or REMAIN THE SAME. Give a reason for the answer. (2)

9.3 Will the mass of electrode B INCREASE or DECREASE when the cell is in operation?

Write down a relevant half reaction to support the answer. (3)

9.4 After ALL the copper was purified, it was found that 2 moles of electrons were transferred from anode to cathode.

Calculate the mass of the IMPURE copper sample. (5)

[11]

GRAND TOTAL [150]

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DATA FOR PHYSICAL SCIENCES GRADE 12
PAPER 2 (CHEMISTRY)

GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 12
VRAESTEL 2 (CHEMIE)

TABLE 1: PHYSICAL CONSTANTS/*TABEL 1: FISIESE KONSTANTES*

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Standard pressure Standaarddruk	p^θ	$1{,}013 \times 10^5$ Pa
Molar gas volume at STP Molêre gasvolume by STD	V_m	22,4 $dm^3 \cdot mol^{-1}$
Standard temperature Standaardtemperatuur	T^θ	273 K
Avogadro's constant	N_A	$6{,}023 \times 10^{23}$ mol^{-1}

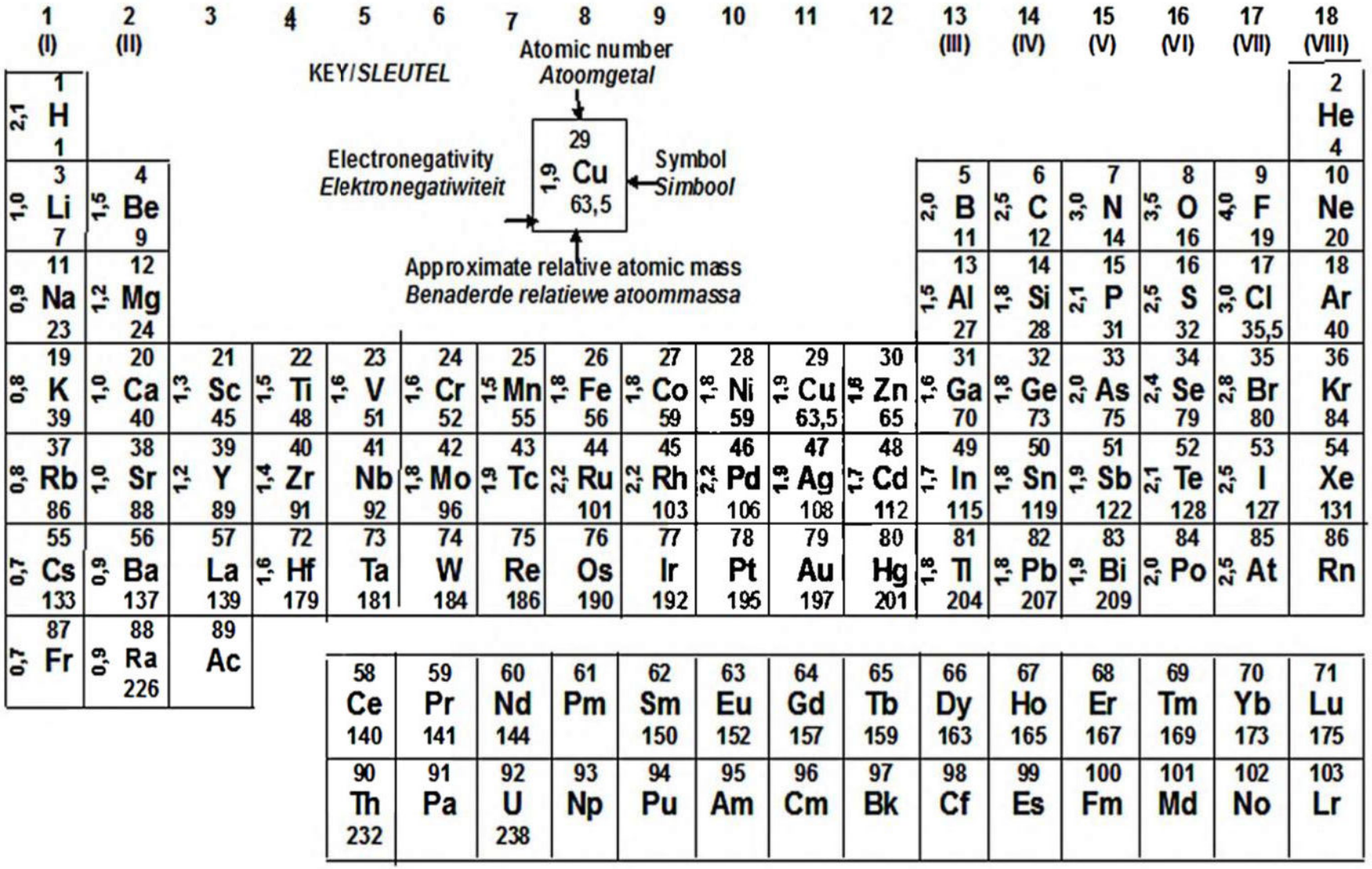
TABLE 2: FORMULAE/*TABEL 2: FORMULES*

$n = \frac{m}{M}$	$n = \frac{N}{N_A}$
$c = \frac{n}{V}$ OR/OF $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$
$\frac{n_a}{n_b} = \frac{c_a V_a}{c_b V_b}$	$pH = -\log[H_3O^+]$
$K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}$ at/ by 298 K	
$E^\theta_{cell} = E^\theta_{cathode} - E^\theta_{anode}$ / $E^\theta_{sel} = E^\theta_{katode} - E^\theta_{anode}$ OR/*OF* $E^\theta_{cell} = E^\theta_{reduction} - E^\theta_{oxidation}$ / $E^\theta_{sel} = E^\theta_{reduksie} - E^\theta_{oksidasie}$ OR/*OF* $E^\theta_{cell} = E^\theta_{oxidising\ agent} - E^\theta_{reducing\ agent}$ / $E^\theta_{sel} = E^\theta_{oksideermiddel} - E^\theta_{reduseermiddel}$	
$n = \frac{Q}{e}$	$n = \frac{Q}{q_e}$

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TABLE 3: THE PERIODIC TABLE OF ELEMENTS
TABLE 3: THE PERIODIC TABLE OF ELEMENTS



Please turn over

TABLE 4A: STANDARD REDUCTION POTENSTIALS
TABEL 4A: STANDAARD-REDUKSIEPOTENSIALE

Increasing strength of oxidising agents/*Toenemende sterkte van oksideermiddels* ↑

Increasing strength of reducing agents/*Toenemende sterkte van reduseermiddels* ↓

Half-reactions/*Halfreaksies*			E^{θ} (V)
$F_2(g) + 2e^-$	⇌	$2F^-$	+ 2,87
$Co^{3+} + e^-$	⇌	Co^{2+}	+ 1,81
$H_2O_2 + 2H^+ + 2e^-$	⇌	$2H_2O$	+ 1,77
$MnO_4^- + 8H^+ + 5e^-$	⇌	$Mn^{2+} + 4H_2O$	+ 1,51
$C\ell_2(g) + 2e^-$	⇌	$2C\ell^-$	+ 1,36
$Cr_2O_7^{2-} + 14H^+ + 4e^-$	⇌	$2Cr^{3+} + 7\ H_2O$	+ 1,33
$O_2(g) + 4H^+ + 4e^-$	⇌	$2H_2O$	+ 1,23
$MnO_2 + 4H^+ + 2e^-$	⇌	$Mn^{2+} + 2H_2O$	+ 1,23
$Pt^{2+} + 2e^-$	⇌	Pt	+ 1,20
$Br_2(\ell) + 2e^-$	⇌	$2Br^-$	+ 1,07
$NO_3^- + 4H^+ + 3e^-$	⇌	$NO(g) + 2H_2O$	+ 0,96
$Hg^{2+} + 2e^-$	⇌	$Hg(\ell)$	+ 0,85
$Ag^+ + e^-$	⇌	Ag	+ 0,80
$NO_3^- + 2H^+ + e^-$	⇌	$NO_2\ (g) + H_2O$	+ 0,80
$Fe^{3+} + e^-$	⇌	Fe^{2+}	+ 0,77
$O_2(g) + 2H^+ + 2e^-$	⇌	H_2O_2	+ 0,68
$I_2 + 2e^-$	⇌	$2I^-$	+ 0,54
$Cu^+ + e^-$	⇌	Cu	+ 0,52
$SO_2 + 4H^+ + 4e^-$	⇌	$S + 2H_2O$	+ 0,45
$2H_2O + O_2 + 4e^-$	⇌	$4OH^-$	+ 0,40
$Cu^{2+} + 2e^-$	⇌	Cu	+ 0,34
$SO_4^{2-} + 4H^+ + 2e^-$	⇌	$SO_2(g) + 2H_2O$	+ 0,17
$Cu^{2+} + e^-$	⇌	Cu^+	+ 0,16
$Sn^{4+} + 2e^-$	⇌	Sn^{2+}	+ 0,15
$S + 2H^+ + 2e^-$	⇌	$H_2S(g)$	+ 0,14
$2H^+ + 2e^-$	⇌	**$H_2(g)$**	**0,00**
$Fe^{3+} + 3e^-$	⇌	Fe	– 0,06
$Pb^{2+} + 2e^-$	⇌	Pb	– 0,13
$Sn^{2+} + 2e^-$	⇌	Sn	– 0,14
$Ni^{2+} + 2e^-$	⇌	Ni	– 0,27
$Co^{2+} + 2e^-$	⇌	Co	– 0,28
$Cd^{2+} + 2e^-$	⇌	Cd	– 0,40
$Cr^{3+} + e^-$	⇌	Cr^{2+}	– 0,41
$Fe^{2+} + 2e^-$	⇌	Fe	– 0,44
$Cr^{3+} + 3e^-$	⇌	Cr	– 0,74
$Zn^{2+} + 2e^-$	⇌	Zn	– 0,76
$2H_2O + 2e^-$	⇌	$H_2(g) + 2OH^-$	– 0,83
$Cr^{2+} + 2e^-$	⇌	Cr	– 0,91
$Mn^{2+} + 2e^-$	⇌	Mn	– 1,18
$A\ell^{3+} + 3e^-$	⇌	$A\ell$	– 1,66
$Mg^{2+} + 2e^-$	⇌	Mg	– 2,36
$Na^+ + e^-$	⇌	Na	– 2,71
$Ca^{2+} + 2e^-$	⇌	Ca	– 2,87
$Sr^{2+} + 2e^-$	⇌	Sr	– 2,89
$Ba^{2+} + 2e^-$	⇌	Ba	– 2,90
$Cs^+ + e^-$	⇌	Cs	- 2,92
$K^+ + e^-$	⇌	K	– 2,93
$Li^+ + e^-$	⇌	Li	– 3,05

TABLE 4B: STANDARD REDUCTION POTENSTIALS

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TABEL 4B: STANDAARD-REDUKSIEPOTENSIALE

Increasing strength of oxidising agents/*Toenemende sterkte van oksideermiddels* ↓

Half-reactions/*Halfreaksies*			E^{θ} (V)
$Li^+ + e^-$	⇌	Li	− 3,05
$K^+ + e^-$	⇌	K	− 2,93
$Cs^+ + e^-$	⇌	Cs	- 2,92
$Ba^{2+} + 2e^-$	⇌	Ba	− 2,90
$Sr^{2+} + 2e^-$	⇌	Sr	− 2,89
$Ca^{2+} + 2e^-$	⇌	Ca	− 2,87
$Na^+ + e^-$	⇌	Na	− 2,71
$Mg^{2+} + 2e^-$	⇌	Mg	− 2,36
$A\ell^{3+} + 3e^-$	⇌	$A\ell$	− 1,66
$Mn^{2+} + 2e^-$	⇌	Mn	− 1,18
$Cr^{2+} + 2e^-$	⇌	Cr	− 0,91
$2H_2O + 2e^-$	⇌	$H_2(g) + 2OH^-$	− 0,83
$Zn^{2+} + 2e^-$	⇌	Zn	− 0,76
$Cr^{3+} + 3e^-$	⇌	Cr	− 0,74
$Fe^{2+} + 2e^-$	⇌	Fe	− 0,44
$Cr^{3+} + e^-$	⇌	Cr^{2+}	- 0,41
$Cd^{2+} + 2e^-$	⇌	Cd	- 0,40
$Co^{2+} + 2e^-$	⇌	Co	- 0,28
$Ni^{2+} + 2e^-$	⇌	Ni	− 0,27
$Sn^{2+} + 2e^-$	⇌	Sn	− 0,14
$Pb^{2+} + 2e^-$	⇌	Pb	− 0,13
$Fe^{3+} + 3e^-$	⇌	Fe	− 0,06
$2H^+ + 2e^-$	⇌	**$H_2(g)$**	**0,00**
$S + 2H^+ + 2e^-$	⇌	$H_2S(g)$	+ 0,14
$Sn^{4+} + 2e^-$	⇌	Sn^{2+}	+ 0,15
$Cu^{2+} + e^-$	⇌	Cu^+	+ 0,16
$SO_4^{2-} + 4H^+ + 2e^-$	⇌	$SO_2(g) + 2H_2O$	+ 0,17
$Cu^{2+} + 2e^-$	⇌	Cu	+ 0,34
$2H_2O + O_2 + 4e^-$	⇌	$4OH^-$	+ 0,40
$SO_2 + 4H^+ + 4e^-$	⇌	$S + 2H_2O$	+ 0,45
$Cu^+ + e^-$	⇌	Cu	+ 0,52
$I_2 + 2e^-$	⇌	$2I^-$	+ 0,54
$O_2(g) + 2H^+ + 2e^-$	⇌	H_2O_2	+ 0,68
$Fe^{3+} + e^-$	⇌	Fe^{2+}	+ 0,77
$NO_3^- + 2H^+ + e^-$	⇌	$NO_2(g) + H_2O$	+ 0,80
$Ag^+ + e^-$	⇌	Ag	+ 0,80
$Hg^{2+} + 2e^-$	⇌	$Hg(\ell)$	+ 0,85
$NO_3^- + 4H^+ + 3e^-$	⇌	$NO(g) + 2H_2O$	+ 0,96
$Br_2(\ell) + 2e^-$	⇌	$2Br^-$	+ 1,07
$Pt^{2+} + 2e^-$	⇌	Pt	+ 1,20
$MnO_2 + 4H^+ + 2e^-$	⇌	$Mn^{2+} + 2H_2O$	+ 1,23
$O_2(g) + 4H^+ + 4e^-$	⇌	$2H_2O$	+ 1,23
$Cr_2O_7^{2-} + 14H^+ + 4e^-$	⇌	$2Cr^{3+} + 7\ H_2O$	+ 1,33
$C\ell_2(g) + 2e^-$	⇌	$2C\ell^-$	+ 1,36
$MnO_4^- + 8H^+ + 5\ e^-$	⇌	$Mn^{2+} + 4H_2O$	+ 1,51
$H_2O_2 + 2H^+ + 2e^-$	⇌	$2H_2O$	+ 1,77
$Co^{3+} + e^-$	⇌	Co^{2+}	+ 1,81
$F_2(g) + 2e^-$	⇌	$2F^-$	+ 2,87

Increasing strength of reducing agents/*Toenemende sterkte van reduseermiddels* ↑

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