basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

PHYSICAL SCIENCES: CHEMISTRY (P2)

MAY/JUNE 2026

MARKS: 150

TIME: 3 hours

PHYSICAL SCIENCES: Paper 2

10842E

X10

This question paper consists of 16 pages and 4 data sheets.

INSTRUCTIONS AND INFORMATION

1. Write your centre number and examination number in the appropriate spaces 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 subquestions, e.g. between QUESTION 2.1 and QUESTION 2.2.

6. You may use a non-programmable calculator.

7. Show ALL formulae and substitutions in ALL calculations.

8. Round off your FINAL numerical answers to a minimum of TWO decimal places.

9. Give brief motivations, discussions, etc. where required.

10. You are advised to use the attached DATA SHEETS.

11. Write neatly and legibly.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various 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 numbers (1.1 to 1.10) in the ANSWER BOOK, e.g. 1.11 E.

1.1 Consider the following reaction.

$$CH_3(CH_2)_6CH_3 \xrightarrow{Heat} CH_3CH_3 + 2CH_2CHCH_3$$

This is an example of a/an ... reaction.

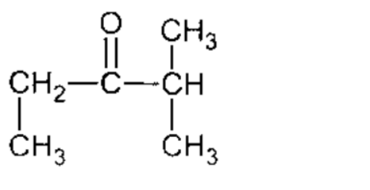
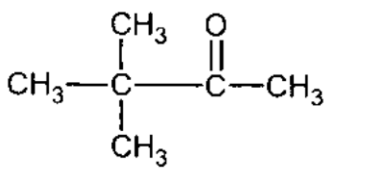
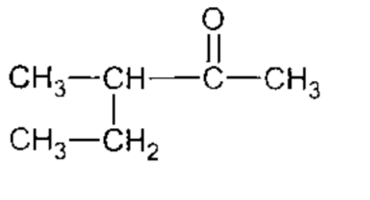
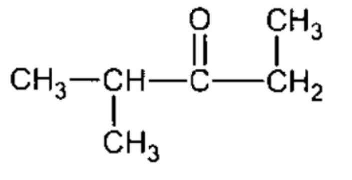
A cracking

B addition

C hydrolysis

D substitution (2)

1.2 Four organic compounds are shown below.

I		**II**	
III		**IV**	

Which of the compounds above have the same IUPAC name?

A **I** and **II**

B **II** and **III**

C **I** and **IV**

D **I** and **III** (2)

1.3 Consider the equation for the reaction below. **R** is the MAJOR PRODUCT.

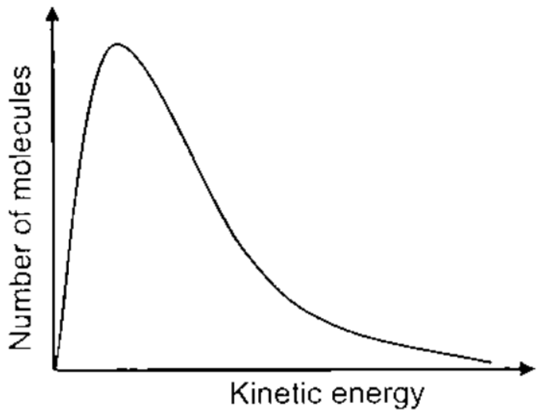
$$CH_3CH_2CHC(CH_3)CH_3 + HBr \rightarrow \textbf{R}$$

Which ONE of the following is the CORRECT combination for the type of reaction and the formula of **R**?

	TYPE OF REACTION	FORMULA OF R
A	Addition	$CH_3CH_2CHBrCH(CH_3)CH_3$
B	Substitution	$CH_3CH_2CH_2CBr(CH_3)CH_3$
C	Addition	$CH_3CH_2CH_2CBr(CH_3)CH_3$
D	Substitution	$CH_3CH_2CHBrCH(CH_3)CH_3$

(2)

1.4 The Maxwell-Boltzmann distribution curve for a sample of a gas in a container is shown below.



Which ONE of the following will change the area under the curve?

A The addition of a catalyst

B A decrease in temperature

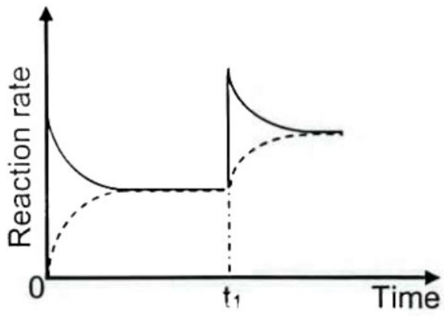
C Gas particles escaping from the container

D A decrease in concentration by increasing the volume of the container (2)

1.5 The reaction below reaches equilibrium in a closed system.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) \qquad \Delta H < 0$$

A change is made to the system at time **t_1**. The reaction rate versus time graph is given below.



Which ONE of the following changes was made to the system at time **t_1**?

A A catalyst was added.

B The pressure was decreased at constant temperature.

C The temperature was increased.

D The concentration of the $H_2(g)$ was increased. (2)

1.6 The equilibrium constant, K_c, for a hypothetical reaction is given by the following expression:

$$K_c = \frac{[A]^2}{[C]^3[D_2]}$$

The equation for this reaction is:

A $3C(g) + D_2(g) \rightleftharpoons 2A(g) + B(s)$

B $2A(g) + B(s) \rightleftharpoons 3C(g) + D_2(g)$

C $3C(g) + D_2(g) \rightleftharpoons 2A(g) + B(g)$

D $2A(\ell) + B(s) \rightleftharpoons 3C(g) + D_2(g)$ (2)

1.7 According to the Arrhenius theory, an acid is …

A a source of H^+ ions in water.

B a source of OH^- ions in water.

C a substance that can accept a proton.

D a substance that can donate a proton. (2)

1.8 A property of sodium nitrate solution, $NaNO_3(aq)$, is that it is…

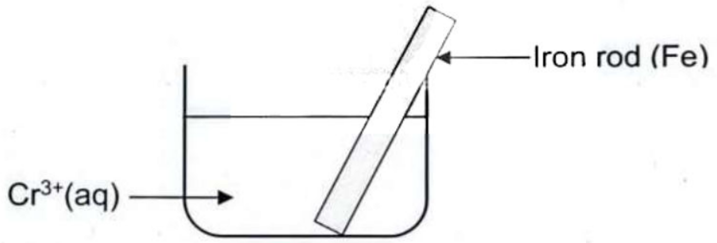
A acidic.

B basic.

C ampholytic.

D neutral. (2)

1.9 An iron rod, Fe(s), is placed in a beaker containing chromium(III) ions, $Cr^{3+}(aq)$.



Which ONE of the following is the CORRECT combination of products formed?

A $Fe^{2+}(aq)$ and $Cr(s)$

B $Fe^{2+}(aq)$ and $Cr^{2+}(aq)$

C $Fe^{3+}(aq)$ and $Cr^{2+}(aq)$

D $Fe^{3+}(aq)$ and $Cr(aq)$ (2)

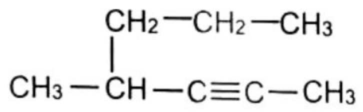
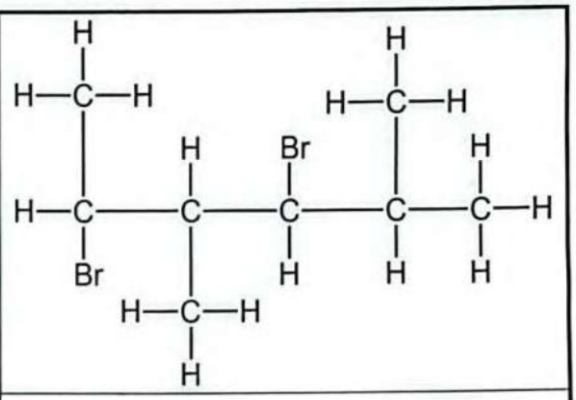
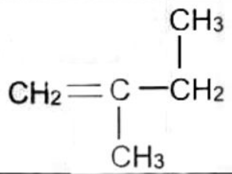
1.10 Which ONE of the following combinations CORRECTLY shows a product formed at the cathode and the change in pH during the electrolysis of a concentrated sodium chloride solution?

	PRODUCT FORMED AT CATHODE	CHANGE IN pH
A	Hydrogen	Decreases
B	Hydrogen	Increases
C	Chlorine	Decreases
D	Chlorine	Increases

(2)
[20]

QUESTION 2 (Start on a new page.)

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

A		B	
C	$C_5H_{10}O_2$	D	Hexanal
E	$CH_3COCH_2CH_2CH_2CH_3$	F	
G	C_5H_{12}		

2.1 Define the term *saturated compound*. (2)

2.2 Write down the letter(s) that represent(s):

2.2.1 A compound with a carbonyl group bonded to two carbon atoms (1)

2.2.2 The compound that is an isomer of compound **E** (1)

2.2.3 Two unsaturated hydrocarbons (1)

2.3 Write down the:

2.3.1 IUPAC name of compound **A** (3)

2.3.2 IUPAC name of compound **B** (3)

2.4 The molecular formula of compound **C**, $C_5H_{10}O_2$, represents two compounds that are functional isomers of each other.

2.4.1 Define the term *functional isomers*. (2)

Write down the:

2.4.2 STRUCTURAL FORMULA for the functional isomer with the stronger intermolecular forces (2)

2.4.3 CONDENSED FORMULA of the functional isomer with the lower boiling point (2)

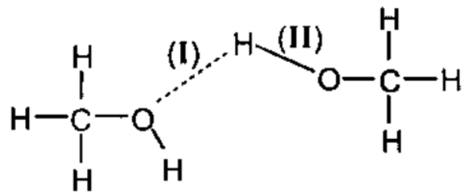
2.5 Is compound **B** a PRIMARY, SECONDARY or TERTIARY haloalkane?

Give a reason for the answer. (2)

2.6 Using MOLECULAR FORMULAE, write down a balanced equation for the combustion of compound **G** in EXCESS oxygen. (3)
[22]

QUESTION 3 (Start on a new page.)

3.1 Consider the diagram of two methanol molecules shown below. **I** and **II** are forces.



Choose **I** OR **II** for EACH of the following:

3.1.1 The force, when broken or overcome, results in a chemical change (1)

3.1.2 The force that requires more energy to overcome (1)

3.1.3 The force responsible for the boiling point of methanol (1)

3.2 In an investigation, the boiling points of four compounds are compared. The boiling points of compounds **A**, **B** and **C** are given below. The boiling point of **D** is indicated as **X**.

	COMPOUNDS	BOILING POINT (°C)
A	Methanol	64,7
B	Ethanol	78,3
C	Butan-1-ol	117,7
D	Butanal	**X**

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

The boiling points of compounds **A**, **B** and **C** are compared.

3.2.2 With reference to molecular structure, give the reason why this is a fair comparison. (1)

3.2.3 Name the intermolecular force responsible for the difference in these boiling points. (1)

3.2.4 Give a reason for the increase in boiling points in terms of the molecular structure of the compounds. (1)

The boiling points of compounds **C** and **D** are compared.

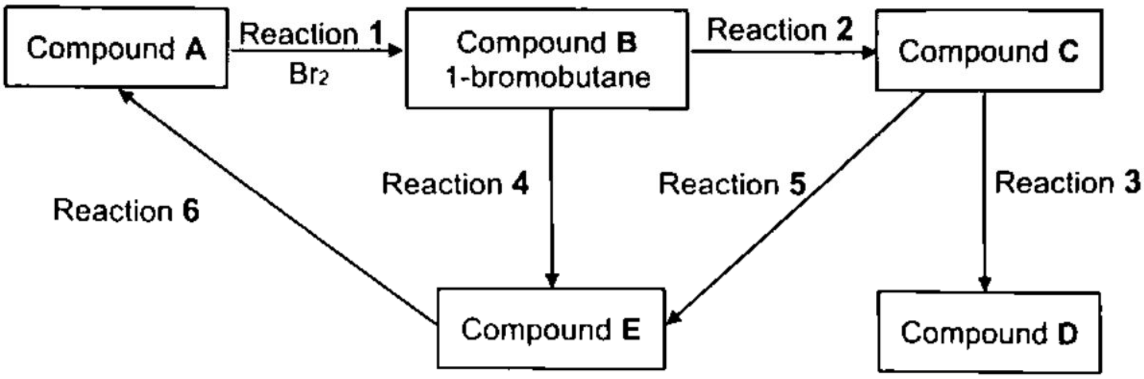
3.2.5 Will **X**, the boiling point of **D**, be GREATER THAN, LESS THAN or EQUAL TO 117,7 °C?

Fully explain the answer. (4)

[12]

QUESTION 4 (Start on a new page.)

Study the flow diagram below. Compounds **A**, **B**, **C**, **D** and **E** are organic compounds.



Reaction **6** is an addition reaction.

4.1 Write down the:

4.1.1 Type of reaction represented by **reaction 1** (2)

4.1.2 Reaction condition for reaction **1** (1)

4.2 In reaction **3**, compound **C** reacts with HCOOH, in the presence of concentrated H_2SO_4.

Write down the:

4.2.1 STRUCTURAL FORMULA of compound **C** (2)

4.2.2 Type of reaction represented by reaction **3** (1)

4.2.3 IUPAC name of compound **D** (2)

4.3 Write down TWO terms for the type of reaction represented by reaction **2**. (2)

4.4 Compound **C** can be converted back to compound **B**.

Write down the FORMULA or NAME of the inorganic reagent needed for this conversion. (1)

4.5 Compounds **B** and **C** can be converted to compound **E**.

4.5.1 Write down ONE term for the type of organic reaction for BOTH reactions **4** and **5**. (1)

Besides heat, write down a reaction condition for:

4.5.2 Reaction **4** (1)

4.5.3 Reaction **5** (1)

Consider reaction **4**:

4.5.4 Using STRUCTURAL FORMULAE, write down the balanced equation. (4)

[18]

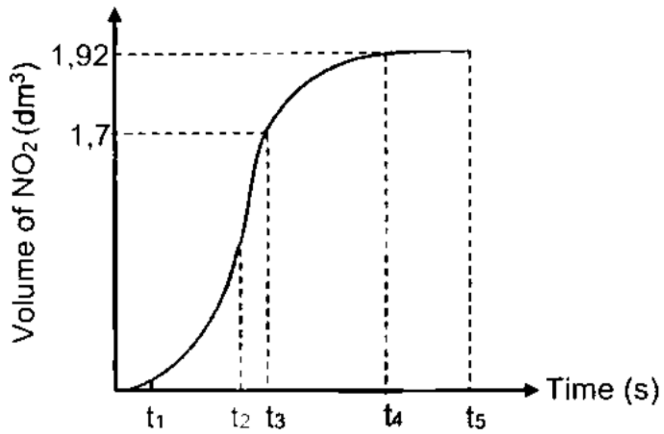
QUESTION 5 (Start on a new page.)

Pure powdered copper, Cu(s), is oxidised IN EXCESS concentrated nitric acid, HNO_3(conc.), as shown by the balanced equation below.

$$Cu(s) + 4HNO_3(conc.) \rightarrow Cu(NO_3)_2(aq) + 2NO_2(g) + 2H_2O(\ell) \quad \Delta H < 0$$

5.1 Explain what is meant by 'IN EXCESS' in the statement above. (2)

5.2 The volume of nitrogen dioxide gas produced is shown in the graph below.



5.2.1 Use the collision theory to explain the decrease in the rate of the reaction between t_3 and t_4. (3)

5.2.2 How does the rate of the reaction at t_2 compare to that at t_1? Choose from HIGHER THAN, LOWER THAN or REMAINS THE SAME. (1)

5.2.3 Give a reason for the answer to QUESTION 5.2.2 by referring to the graph. (1)

5.2.4 Calculate the value of time t_3 if the average rate for the production of 1,7 dm^3 of NO_2(g) is 0,02 $dm^3 \cdot s^{-1}$. (2)

5.2.5 The initial concentration of the nitric acid is 12 $mol \cdot dm^{-3}$. If 20 cm^3 of nitric acid is used, calculate the hydronium ion concentration after the reaction is completed. (Assume the volume of the acid does not change.)

Take the molar gas volume to be 25 $dm^3 \cdot mol^{-1}$. (6)

A change is made to the reaction conditions and the reaction is repeated.

5.2.6 Which ONE of the following changes will result in more NO_2 gas being produced when the reaction is completed?
Choose from A, B or C. (Write down only the letter.)

A	A piece of pure copper with the same mass is used.
B	Impure copper with greater mass is used.
C	Higher concentration HNO_3 in excess is used.

(2)

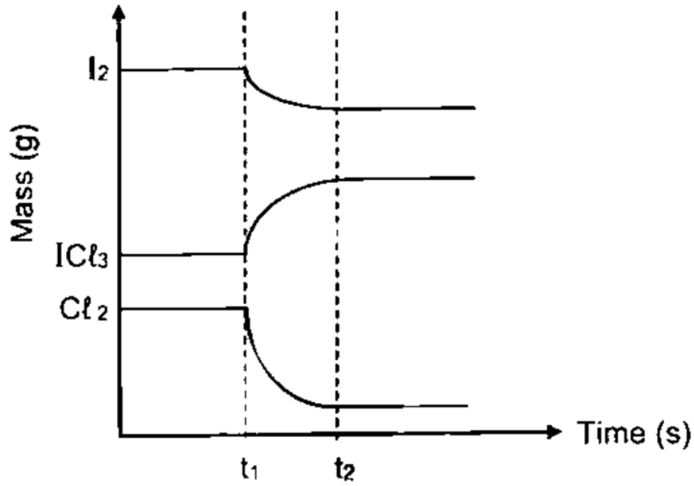
5.3 Determine the oxidation number of nitrogen in HNO_3. (2)
[19]

QUESTION 6 (Start on a new page.)

Iodine gas, $I_2(g)$, reacts with chlorine gas, $Cl_2(g)$, in a sealed container at temperature T. Equilibrium is reached according to the balanced equation below.

$$I_2(g) + 3Cl_2(g) \rightleftharpoons 2ICl_3(g) \qquad \Delta H = -390\ kJ{\cdot}mol^{-1}$$

The graph below shows the masses of $I_2(g)$, $Cl_2(g)$ and $ICl_3(g)$ versus time during the course of the reaction.



6.1 State Le Chatelier's principle. (2)

6.2 Why are the masses constant after t_2? (1)

6.3 At t_1, the pressure is adjusted by changing the volume of the container at constant temperature.

Was the volume of the container INCREASED or DECREASED?

Explain the answer. (3)

6.4 What other change to the equilibrium system will produce a SIMILAR change to the masses at t_1? (2)

6.5 The volume of the container is 2 dm^3. At t_2 the concentrations of the gases are:

$[I_2] = 0,15\ mol{\cdot}dm^{-3}$
$[Cl_2] = 0,36\ mol{\cdot}dm^{-3}$
$[ICl_3] = 0,05\ mol{\cdot}dm^{-3}$

More I_2 is now added to the container. When a new equilibrium is reached, the concentration of ICl_3 is 0,09 $mol{\cdot}dm^{-3}$. If the equilibrium constant, K_c, is 0,357, calculate the number of moles of I_2 added. (8)

[16]

QUESTION 7 (Start on a new page.)

7.1 Water ionises according to the balanced equation:

$$2H_2O(\ell) \rightleftharpoons H_3O^+(aq) + OH^-(aq)$$

The equilibrium constant for the ionisation of water, K_w, varies with temperature, as shown in the table below.

TEMPERATURE (°C)	K_w
25	$1,00 \times 10^{-14}$
50	$5,48 \times 10^{-14}$

7.1.1 Is the ionisation of water EXOTHERMIC or ENDOTHERMIC?

Explain the answer. (3)

7.1.2 Calculate the concentration of H_3O^+ ions in water at 50 °C. (2)

7.1.3 How will the pH of water be affected when the temperature increases? Choose from INCREASES, DECREASES or STAYS THE SAME. Give a reason for the answer by referring to the formula used to calculate pH. (2)

7.2 Water is an ampholyte.

Write down the balanced equation for the reaction of water with $HCO_3^-(aq)$ where:

7.2.1 Water acts as an acid (2)

7.2.2 Water acts as a base (2)

7.3 The table below shows the equilibrium constants, K_a, of four acids, each having a concentration of 0,1 mol·dm^{-3} at 25 °C. The acids are used as electrolytes.

ACID	K_a
H_2CO_3	$4,3 \times 10^{-7}$
CH_3COOH	$1,8 \times 10^{-5}$
HNO_2	$4,6 \times 10^{-4}$
$H_2C_2O_4$	$6,0 \times 10^{-2}$

7.3.1 Define the term *electrolyte*. (1)

7.3.2 Which ONE of the above acids is the most effective electrolyte? Give a reason for the answer. (2)

7.4 An antacid tablet contains a mixture of $A\ell(OH)_3$ and $Mg(OH)_2$ only. This tablet is reacted with 50 cm^3 of a 0,5 $mol{\cdot}dm^{-3}$ $HC\ell$ solution. The balanced equations for the two reactions that take place are:

$$A\ell(OH)_3(s) + 3HC\ell(aq) \rightarrow A\ell C\ell_3(aq) + 3H_2O(\ell)$$

$$Mg(OH)_2(s) + 2HC\ell(aq) \rightarrow MgC\ell_2(aq) + 2H_2O(\ell)$$

The resulting solution is completely neutralised by 26,5 cm^3 of a 0,378 $mol{\cdot}dm^{-3}$ NaOH solution.

$$NaOH(aq) + HC\ell(aq) \rightarrow NaC\ell(aq) + H_2O(\ell)$$

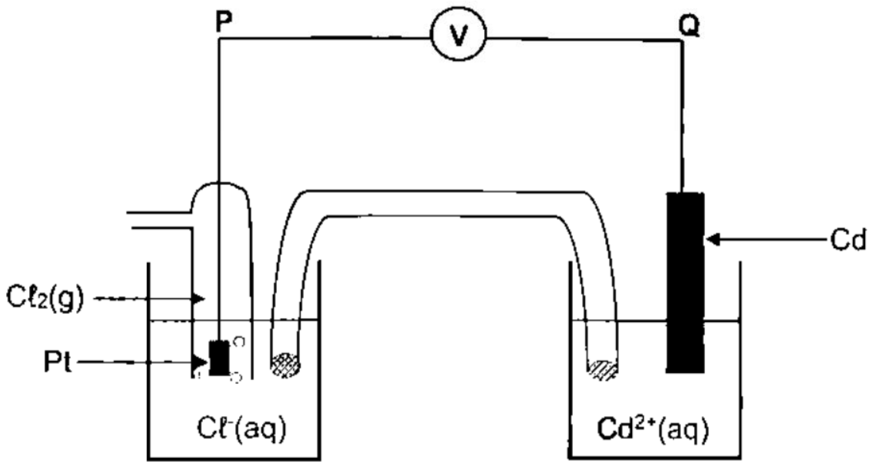
7.4.1 Calculate the number of moles of hydroxide ions present in the tablet. (5)

7.4.2 If the tablet contains an equal number of moles of aluminium hydroxide and magnesium hydroxide, calculate the mass of $A\ell(OH)_3(s)$ in the tablet. (5)

[24]

QUESTION 8 (Start on a new page.)

A group of learners set up a standard galvanic cell, as shown below.



8.1 Define the term *galvanic cell.* (2)

8.2 For this cell, write down the:

8.2.1 Cell notation (3)

8.2.2 Direction of the electron flow. Choose from **P TO Q** or **Q TO P**. (1)

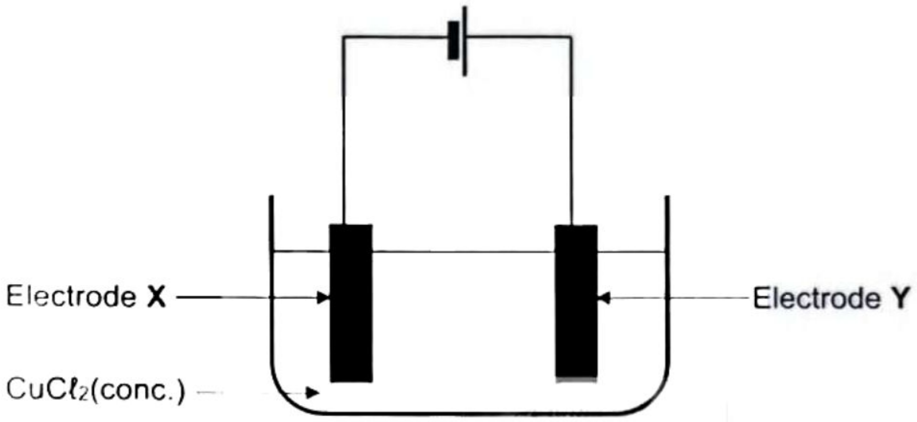
8.2.3 Reduction half-reaction (2)

8.3 How will the reading on the voltmeter be affected when the concentration of the chloride ions is increased? Choose from INCREASES, DECREASES or REMAINS THE SAME.

Give a reason for the answer. (2)
[10]

QUESTION 9 (Start on a new page.)

An electrolytic cell is set up for the electrolysis of a concentrated copper(II) chloride solution, $CuCl_2$(conc.). **X** and **Y** are carbon electrodes.



9.1 Define the term *electrolysis*. (2)

9.2 Write down balanced equations for TWO reactions that will take place at the anode. (4)

9.3 Write down the NAME or FORMULA of the substance produced in higher amount at electrode **Y**. (1)

9.4 A solution of zinc iodide, ZnI_2, is added to the electrolyte of this cell. What product(s) will be formed at:

9.4.1 Electrode **X** (1)

9.4.2 Electrode **Y** (1)

[9]

TOTAL: 150

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
Charge on electron *Lading op elektron*	e	$1{,}6 \times 10^{-19}$ C
Avogadro's constant *Avogadro-konstante*	N_A	$6{,}02 \times 10^{23}\ mol^{-1}$

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

$n = \frac{m}{M}$	$n = \frac{N}{N_A}$
$c = \frac{n}{V}$ or/*of* $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$
$\frac{c_aV_a}{c_bV_b} = \frac{n_a}{n_b}$	$pH = -\log[H_3O^+]$
$K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}$ 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* $E^{\theta}_{cell} = E^{\theta}_{oxidising\ agent} - E^{\theta}_{reducing\ agent}$ / $E^{\theta}_{sel} = E^{\theta}_{oksideermiddel} - E^{\theta}_{reduseermiddel}$	

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TABLE 3: THE PERIODIC TABLE OF ELEMENTS
TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE

KEY/*SLEUTEL*

Atomic number / *Atoomgetal*	29
Electronegativity / *Elektronegatiwiteit*	1,9
Symbol / *Simbool*	Cu
Approximate relative atomic mass / *Benaderde relatiewe atoommassa*	63,5

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
1 2,1 H 1																	2 He 4
3 1,0 Li 7	4 1,5 Be 9											5 2,0 B 11	6 2,5 C 12	7 3,0 N 14	8 3,5 O 16	9 4,0 F 19	10 Ne 20
11 0,9 Na 23	12 1,2 Mg 24											13 1,5 Aℓ 27	14 1,8 Si 28	15 2,1 P 31	16 2,5 S 32	17 3,0 Cℓ 35,5	18 Ar 40
19 0,8 K 39	20 1,0 Ca 40	21 1,3 Sc 45	22 1,5 Ti 48	23 1,6 V 51	24 1,6 Cr 52	25 1,5 Mn 55	26 1,8 Fe 56	27 1,8 Co 59	28 1,8 Ni 59	29 1,9 Cu 63,5	30 1,6 Zn 65	31 1,6 Ga 70	32 1,8 Ge 73	33 2,0 As 75	34 2,4 Se 79	35 2,8 Br 80	36 Kr 84
37 0,8 Rb 86	38 1,0 Sr 88	39 1,2 Y 89	40 1,4 Zr 91	41 Nb 92	42 1,8 Mo 96	43 1,9 Tc	44 2,2 Ru 101	45 2,2 Rh 103	46 2,2 Pd 106	47 1,9 Ag 108	48 1,7 Cd 112	49 1,7 In 115	50 1,8 Sn 119	51 1,9 Sb 122	52 2,1 Te 128	53 2,5 I 127	54 Xe 131
55 0,7 Cs 133	56 0,9 Ba 137	57 La 139	72 1,6 Hf 179	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 1,8 Tℓ 204	82 1,8 Pb 207	83 1,9 Bi 209	84 2,0 Po	85 2,5 At	86 Rn
87 0,7 Fr	88 0,9 Ra 226	89 Ac															

58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

TABEL 4A: STANDAARD-REDUKSIEPOTENSIALE

Increasing strength of oxidising agents/Toenemende sterkte van oksideermiddels

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
$Cl_2(g) + 2e^-$	⇌	$2Cl^-$	+ 1,36
$Cr_2O_7^{2-} + 14H^+ + 6e^-$	⇌	$2Cr^{3+} + 7H_2O$	+ 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
$Al^{3+} + 3e^-$	⇌	Al	− 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

Increasing strength of reducing agents/Toenemende sterkte van reduseermiddels

TABEL 4B: 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)
$Li^+ + e^-$	⇌	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
$Al^{3+} + 3e^-$	⇌	Al	− 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
$Cr_2O_7^{2-} + 14H^+ + 6e^-$	⇌	$2Cr^{3+} + 7H_2O$	+ 1,33
$Cl_2(g) + 2e^-$	⇌	$2Cl^-$	+ 1,36
$MnO_4^- + 8H^+ + 5e^-$	⇌	$Mn^{2+} + 4H_2O$	+ 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