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NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2026

PHYSICAL SCIENCES P2: (CHEMISTRY)

MARKS: **150**

TIME: **3 hours**

This question paper consists of 20 pages, including 4 data sheets.

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INSTRUCTIONS AND INFORMATION

1. Write your name and surname 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 subquestions, 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. Show ALL formulae and substitutions in ALL calculations.
9. Round off your FINAL numerical answers to a minimum of TWO decimal places.
10. Give brief motivations, discussions, etc. where required.
11. You are advised to use the attached DATA SHEETS.
12. Write neatly and legibly.

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QUESTION 1: MULTIPLE-CHOICE QUESTIONS

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

1.1 The name of the functional group of CARBOXYLIC ACIDS is, the …

A formyl group.

B carboxyl group.

C carbonyl group.

D hydroxyl group. (2)

1.2 Which ONE of the following compounds has the LOWEST melting point?

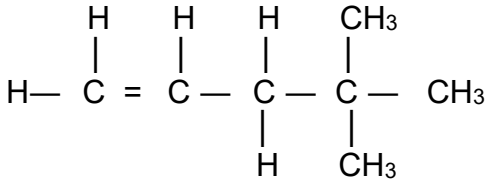
A Propane

B Butane

C Pentane

D Hexane (2)

1.3 Consider the organic compound below:



The IUPAC name of the compound above is …

A 4,4-dimethylpent-4-ene

B 2,2-dimethylpent-1-ene

C 2,2-dimethylpent-4-ene

D 4,4-dimethylpent-1-ene (2)

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1.4 What is the IUPAC NAME of the major product that will be formed when pentan-2-ol is heated in the presence of an acid catalyst?

A Pentane

B Pent-2-ene

C Pent-1-ene

D Pentanal (2)

1.5 The activated complex can best be described as the …

A energy absorbed or released in a chemical reaction.

B minimum energy needed for a reaction to take place.

C unstable transition state from reactants to products.

D increase in the kinetic energy of reactants. (2)

1.6 Consider the following equilibrium:

$$COBr_2(g) \rightleftharpoons CO(g) + Br_2(g) \qquad \Delta H > 0$$

The pressure of the equilibrium mixture is increased. Which ONE of the following combinations are CORRECT at the new equilibrium?

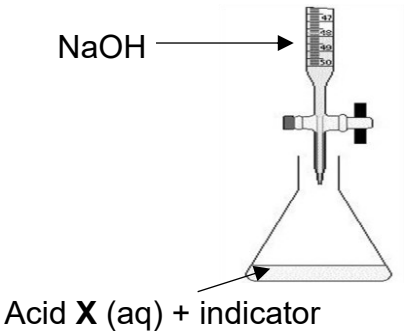
	[$COBr_2$]	**K_C VALUE**
A	DECREASE	REMAINS THE SAME
B	INCREASE	REMAINS THE SAME
C	INCREASE	DECREASE
D	DECREASE	INCREASE

(2)

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1.7 Sodium hydroxide (NaOH) is titrated against acid **X** as shown in the diagram below. At the equivalence point the Ph is greater than 7.

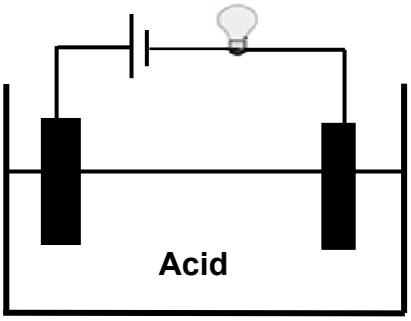


Which ONE of the following combinations CORRECTLY identifies the acid **X** and the most SUITABLE indicator in the Erlenmeyer flask?

	Acid X	**Indicator**
A	HCℓ	Bromothymol blue
B	CH_3COOH	Phenolphthalein
C	CH_3COOH	Bromothymol blue
D	HCℓ	Phenolphthalein

(2)

1.8 The conductivity of three acid solutions with the same concentration, **CH_3COOH**, **HNO_3** and **H_2SO_4**, is investigated as shown below.



The INCREASING order of the brightness of the lightbulb due to the conductivity of the acids is given by:

A HNO_3, CH_3COOH, H_2SO_4

B CH_3COOH, HNO_3, H_2SO_4

C H_2SO_4, HNO_3, CH_3COOH

D H_2SO_4, CH_3COOH, HNO_3

(2)

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1.9 Consider the balanced net ionic equation for the reaction that occurs in a galvanic cell:

$$Fe^{2+} + C\ell_2 \longrightarrow Fe^{3+} + 2\ C\ell^-$$

Which ONE of the following is the CORRECT cell notation for the galvanic cell?

A $Pt \mid Fe^{3+}, Fe^{2+} \parallel C\ell^- \mid C\ell_2 \mid Pt$

B $Pt \mid C\ell^- \mid C\ell_2 \parallel Fe^{3+}, Fe^{2+} \mid Pt$

C $Pt \mid Fe^{2+}, Fe^{3+} \parallel C\ell_2 \mid C\ell^- \mid Pt$

D $Pt \mid C\ell_2 \mid C\ell^- \parallel Fe^{2+}, Fe^{3+} \mid Pt$ (2)

1.10 Consider the following statements regarding an electrolytic cell.

I Electrons flow from anode to cathode.
II The anode is the negative electrode.
II The oxidising agent is reduced at the cathode.

Which of the above statement(s) is/are TRUE?

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

B **III** only

C **II** and **III** only

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

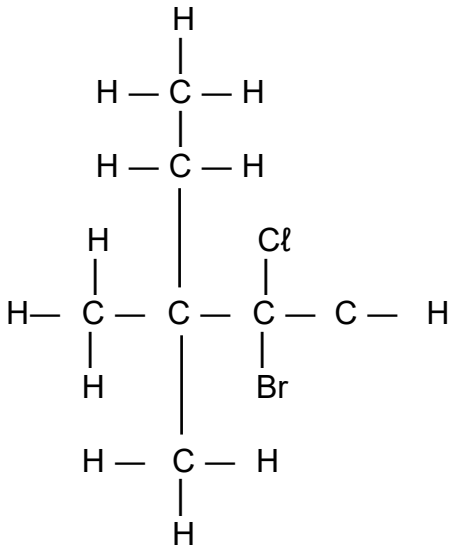
[20]

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QUESTION 2 (Start on a new page.)

The table below shows organic molecules (**A–D**) from different homologous series.

A	$CH_3CH_2C(CH_3)_2CH_3$	**B**	$C(CH_3)_3OH$
C		**D**	Butyl ethanoate

2.1 Define the term *functional group.* (2)

2.2 Write down the:

2.2.1 Name of the homologous series to which compound **C** belong (1)

2.2.2 GENERAL FORMULA of compound **B** (1)

2.3 Write down the IUPAC name of:

2.3.1 Compound **A** (2)

2.3.2 Compound **C** (3)

2.4 Consider compound **B**.

2.4.1 Is compound **B** a PRIMARY, SECONDARY or TERTIARY ALCOHOL?

Give a reason for the answer. (2)

2.4.2 Write down its IUPAC name. (2)

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2.5 Draw the CONDENSED STRUCTURAL FORMULA of the functional isomer of compound **D**. (2)

2.6 Compound **A** undergoes complete combustion. Write down the balancing equation for this reaction by using MOLECULAR FORMULAE. (3)
[18]

QUESTION 3 (Start on a new page.)

Three compounds of used to investigate one of the factors that affect the boiling point of organic compounds.

The table below shows the results obtained.

ORGANIC COMPOUND	BOILING POINT (°C)
Butanone	79,6
Butan-1-ol	117,7
Propanoic acid	141

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

3.2 Write down the controlled variable for this investigation. (1)

3.3 Fully explain the difference in the boiling points of the compounds. (4)

3.4 Butan-1-ol is now compared to its chain isomer.

3.4.1 Write down the IUPAC name of the chain isomer of butan-1-ol. (2)

3.4.2 How will the vapour pressure of the chain isomer compare to that of butan-1-ol?

Write down only HIGHER THAN, LOWER THAN or EQUAL TO.

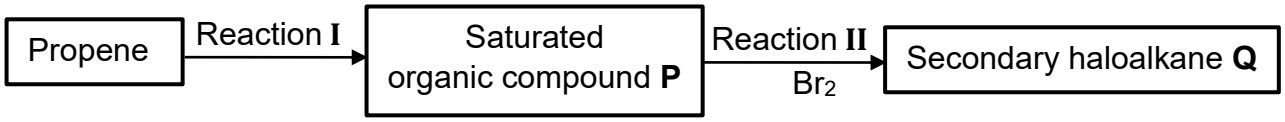
Fully explain the answer. (4)
[13]

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QUESTION 4 (Start on a new page.)

Consider the flow diagram below.



4.1 Consider reaction **I**:

Write down the:

4.1.1 Name of reaction (1)

4.1.2 Name or formula of catalyst needed for the reaction (1)

4.2 Consider reaction **II**:

Write down the:

4.2.1 Reaction condition required (1)

4.2.2 IUPAC name of the organic compound **Q** (2)

4.2.3 Draw the STRUCTURAL FORMULA of the minor product produced in reaction **II**. (2)

4.3 Write down the balanced equation by using STRUCTURAL FORMULAE for the reaction between organic compound **Q** that is strongly heated in concentration NaOH. (6)

4.4 Consider the incomplete reaction below:

CH_3CH_2OH + carboxylic acid **R** $\rightarrow$ organic compound **S** + H_2O

Organic compound **S** has a molar mass of 88 $g \cdot mol^{-1}$.

4.4.1 Write down the name of the reaction. (1)

4.4.2 Name ONE piece of evidence that confirms the production of the organic compound **S.** (1)

4.4.3 Determine the IUPAC name organic compound **S**. (3)

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QUESTION 5 (Start on a new page.)

The reaction between sodium carbonate (Na_2CO_3) and EXCESS hydrochloric acid ($HC\ell$) is used to investigate factors that affect the rate of a chemical reaction. The balanced equation for the reaction is:

$$Na_2CO_3\ (s) + 2\ HC\ell\ (aq) \rightarrow 2\ NaC\ell\ (aq) + H_2O\ (\ell) + CO_2\ (g)$$

In the investigation 2,3 g of sodium carbonate is added to hydrochloric acid in all four experiments.

The table below summarises the reaction conditions in each experiment.

EXP.	CONCENTRATION OF $HC\ell$ ($mol{\cdot}dm^{-3}$)	VOLUME OF $HC\ell$ (cm^3)	STATE OF DIVISION OF Na_2CO_3	INITIAL TEMPERATURE OF ACID (°C)
1	1	100	Lumps	25
2	0,5	100	Lumps	25
3	1	100	Powder	25
4	1	100	Powder	35

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

5.2 For the investigation between experiment **1** and **2**, write down the:

5.2.1 Independent variable (1)

5.2.2 Dependent variable (1)

5.3 How will the volume of $CO_2(g)$ produce in experiment **2** compare to that produced in experiment **3**?

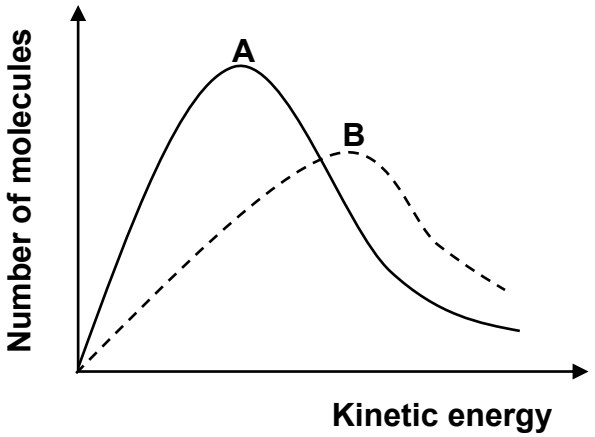
Choose from GREATER THAN, SMALLER THAN or EQUAL TO. (1)

5.4 Use the collision theory to explain why the reaction rate in experiment **3** will be higher than that in experiment **1**. (3)

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5.5 The Maxwell-Boltzmann energy distribution curves for particles in each of experiments **3** and **4** are shown below.



5.5.1 Which experiment, **3** or **4**, is represented by **B**? (1)

5.5.2 Explain the answer to QUESTION 5.5.1. (2)

5.6 Calculate the average rate at which hydrochloric acid (HCℓ) in experiment **3** reacts in $mol \cdot dm^{-3} \cdot s^{-1}$ if the reaction takes 20 s to reach completion.

Assume the volume remains constant. (5)
[16]

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QUESTION 6 (Start on a new page.)

A few crystals of potassium chromate (K_2CrO_4) are dissolved in water in a test tube. The solution is yellow in colour. With addition of a little amount of concentrated nitric acid the solution changes to **orange**. The following equilibrium reaction occurs:

$$\underset{\textbf{yellow}}{2\ CrO_4^{2-}(aq)} + 6\ H^+(aq) \rightleftharpoons \underset{\textbf{orange}}{Cr_2O_7^{2-}(aq)} + H_2O(\ell) \qquad \Delta H < 0$$

6.1 State Le Chatelier's principle. (2)

6.2 How will the colour of the equilibrium mixture be affected in the following?

Choose from BECOMES YELLOW, STAYS ORANGE or NO CHANGE

6.2.1 The test tube is placed in ice-cold water for a few minutes. (1)

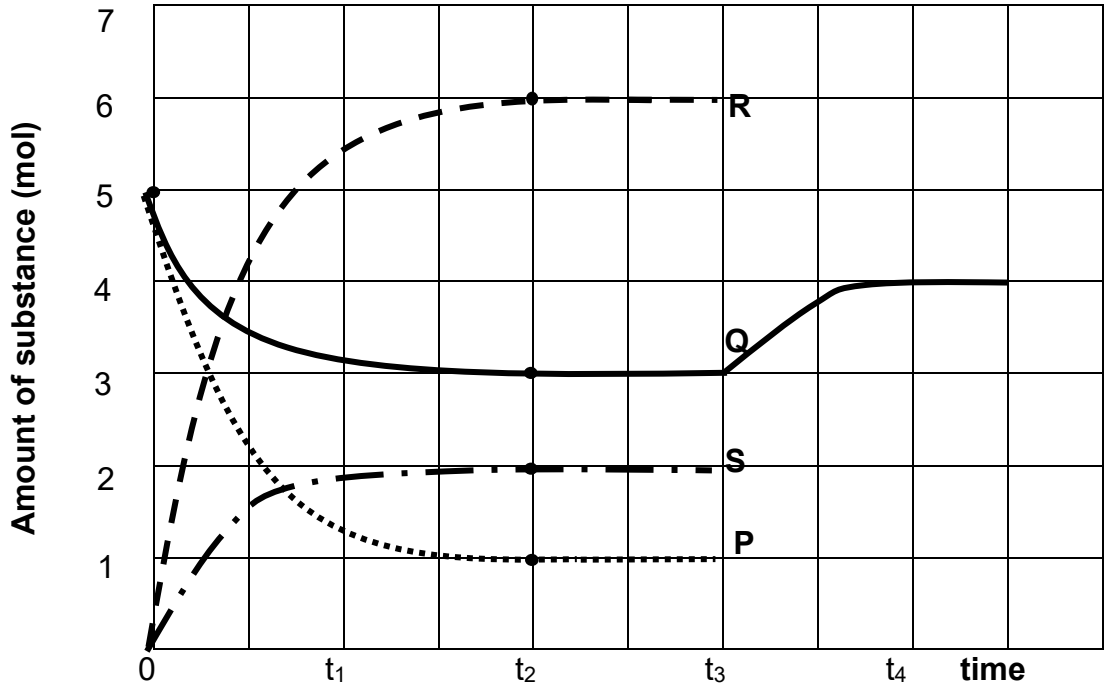
6.2.2 If the pH of the solution is increased. (1)

6.2.3 Explain the answer to QUESTION 6.2.2 by referring to Le Chatelier's principle. (2)

6.3 Consider the following hypothetical reaction that takes place in a 2 dm^3 container.

$$\boldsymbol{a}\ P(g) + \boldsymbol{b}\ Q(g) \rightleftharpoons \boldsymbol{c}\ R(g) + \boldsymbol{d}\ S(g)$$

The graph below represents the change in mole of the substances.



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6.3.1 Determine the values of ***a***, ***b***, ***c*** and ***d***. (2)

At t_3 the temperature of the equilibrium mixture is increased.

6.3.2 Is the forward reaction EXOTHERMIC or ENDOTHERMIC?

Fully explain the answer. (4)

6.3.3 Calculate the equilibrium constant, K_c after t_4. (7)

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QUESTION 7 (Start on a new page.)

7.1 Consider the following ionisation reactions:

I	HSO_4^- (aq) + $H_2O(\ell) \rightarrow SO_4^{2-}$(aq) + H_3O^+(aq)	$K_a = 1,3 \times 10^{-2}$
II	HCO_3^- (aq) + $H_2O(\ell) \rightarrow CO_3^{2-}$(aq) + H_3O^+(aq)	$K_a = 4,8 \times 10^{-11}$

7.1.1 Define an *acid* in terms of the Lowry-Brønsted theory. (1)

7.1.2 Which ONE of HSO_4^- or HCO_3^- is the stronger acid?

Give a reason for the answer by referring to the given data. (2)

7.1.3 Write down ONE conjugate acid-base pair in reaction **II**. (2)

7.2 Is sodium oxalate ($Na_2C_2O_4$) ACIDIC, NEUTRAL or ALKALINE in aqueous solution?

Explain the answer with an aid of a chemical equation. (3)

7.3 90 cm^3 of a 0,45 $mol \cdot dm^{-3}$ HBr, which is a strong acid, reacts with a 1,6 g unknown metal hydroxide $M(OH)_2$ according to the following balanced equation:

$$2\ HBr\ (aq) + M(OH)_2\ (s) \rightarrow\ MBr_2\ (aq) + 2\ H_2O(\ell)$$

7.3.1 Calculate the total number of moles of HBr. (3)

The final solution has a pH of 1,04.

7.3.2 Determine the unknown metal **M** with the aid of relevant calculations (8)

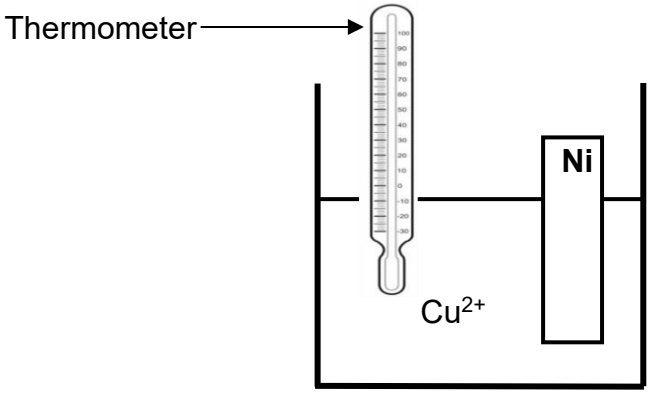
[19]

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QUESTION 8 (Start on a new page.)

8.1 A clean piece of nickel (Ni) is placed in a beaker containing copper (Cu^{2+}) solution as shown in the diagram below.



It is observed that the reading on the thermometer increases which indicates that a spontaneous redox reaction had taken place.

8.1.1 Define the term *reduction* in terms of electron transfer. (2)

8.1.2 Refer to the relevant strengths of the reducing agents to explain why a redox reaction had taken place. (3)

8.2 A galvanic cell is set-up under standard conditions using Cu^{2+} | Cu as a fixed half-cell. Half-cell **B** is changed and connected to the standard Cu^{2+} | Cu half-cell and the initial voltmeter reading is recorded. The results are shown in table below.

EXP.	HALF-CELL B	INITIAL VOLTMETER READING (V)
1	Ni | Ni^{2+}	0,61
2	Fe | Fe^{2+}	0,78
3	**X** | $\mathbf{X}^{2+}$	2,00

8.2.1 State ONE standard condition that is applicable to these cells. (1)

8.2.2 Will the concentration of Fe^{2+} in experiment **2** INCREASE, DECREASE or REMAIN THE SAME as the cell is in operation?

Give a reason for the answer. (2)

8.2.3 Write down the conclusion regarding the relevant strength of the reducing agents and the initial voltmeter readings for experiments **1** and **2**. (2)

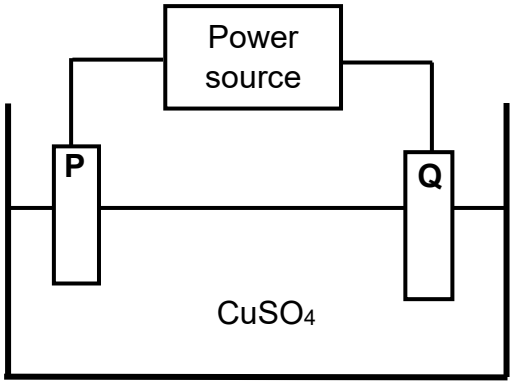
8.2.4 Identify **X** using relevant calculation (5)

[15]

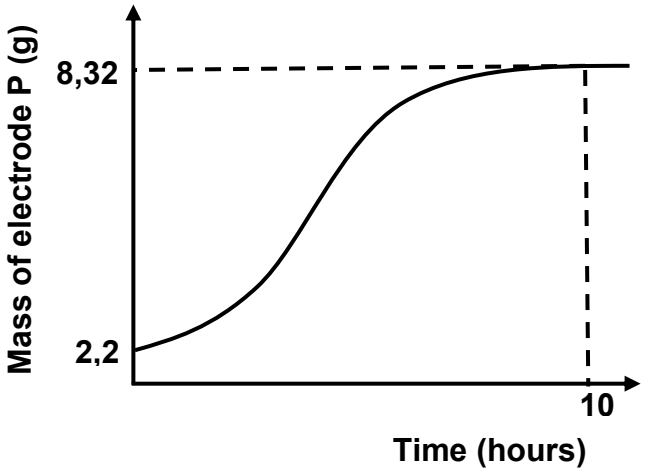
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QUESTION 9 (Start on a new page.)

The electrolytic cell below is set up to obtain pure copper from a piece of impure copper. The impure copper contains platinum and silver.



The graph below, NOT drawn to scale, represents the changes in the mass of electrode **P** during electrolysis.



9.1 Is the power source an AC or DC? Give a reason for the answer. (2)

9.2 Which electrode, **P** or **Q**, contains the impure copper?

Give a reason for the answer. (2)

9.3 Write down the half-reaction that occurs at electrode **P.** (2)

9.4 How will the concentration of $CuSO_4$ at the start of the process compare to that after 10 hours?

Choose from INCREASES, DECREASES or REMAINS THE SAME. (1)

9.5 Calculate the number of electrons transferred during the process. (5)

[12]

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 teen 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 se konstante	N_A	$6{,}02 \times 10^{23}$ mol^{-1}

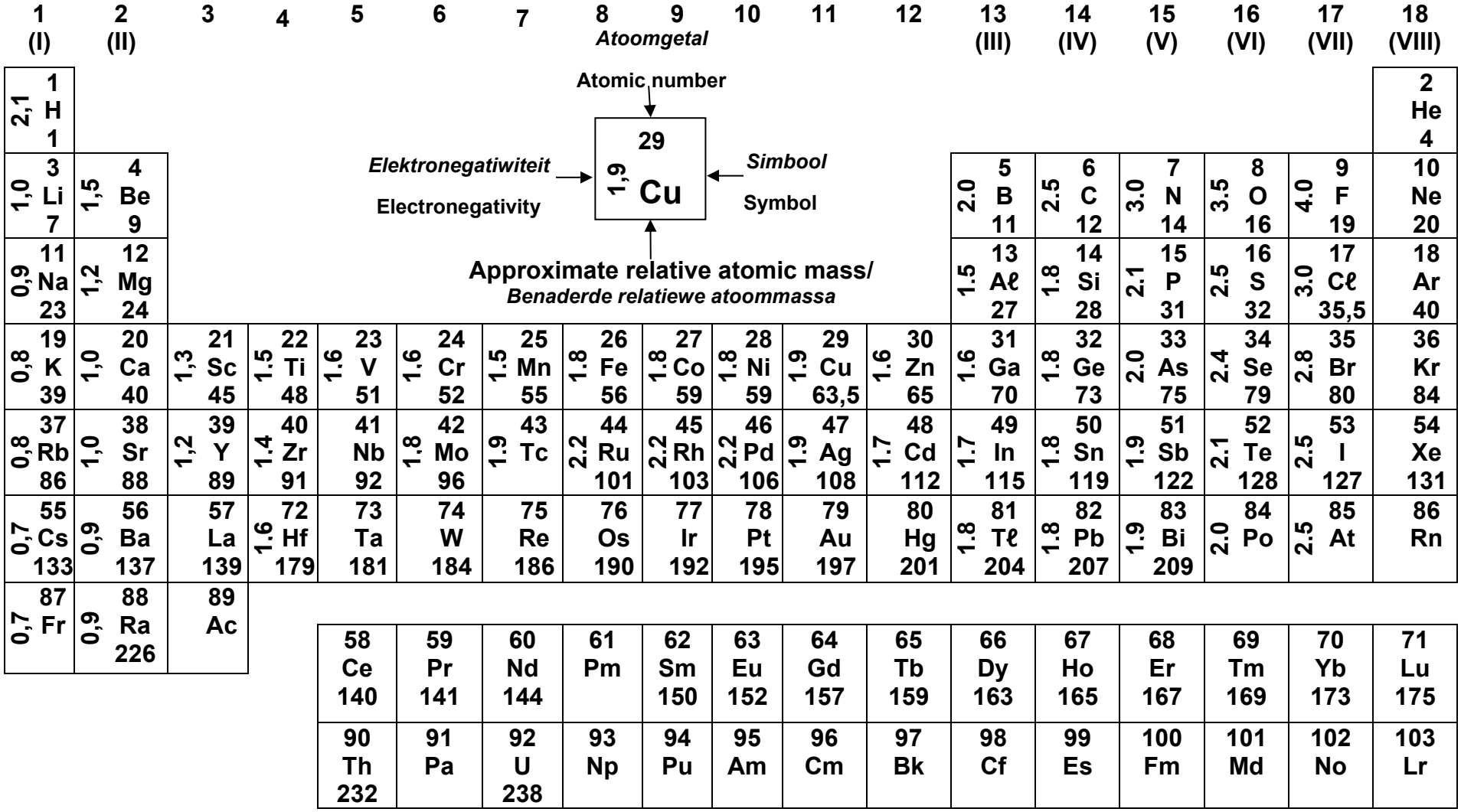
TABLE 2: FORMULAE/*TABEL 2: FORMULES*

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

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

KEY/ *SLEUTEL*



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TABLE 4A: STANDARD REDUCTION POTENTIALS
TABEL 4A: STANDAARD REDUKSIEPOTENSIALE

Half-reactions/*Halfreaksies*			E^{θ} (V)
$F_2(g) + 2e^-$	$\rightleftharpoons$	$2F^-$	+ 2,87
$Co^{3+} + e^-$	$\rightleftharpoons$	Co^{2+}	+ 1,81
$H_2O_2 + 2H^+ + 2e^-$	$\rightleftharpoons$	$2H_2O$	+1,77
$MnO_4^- + 8H^+ + 5e^-$	$\rightleftharpoons$	$Mn^{2+} + 4H_2O$	+ 1,51
$C\ell_2(g) + 2e^-$	$\rightleftharpoons$	$2C\ell^-$	+ 1,36
$Cr_2O_7^{2-} + 14H^+ + 6e^-$	$\rightleftharpoons$	$2Cr^{3+} + 7H_2O$	+ 1,33
$O_2(g) + 4H^+ + 4e^-$	$\rightleftharpoons$	$2H_2O$	+ 1,23
$MnO_2 + 4H^+ + 2e^-$	$\rightleftharpoons$	$Mn^{2+} + 2H_2O$	+ 1,23
$Pt^{2+} + 2e^-$	$\rightleftharpoons$	Pt	+ 1,20
$Br_2(\ell) + 2e^-$	$\rightleftharpoons$	$2Br^-$	+ 1,07
$NO_3^- + 4H^+ + 3e^-$	$\rightleftharpoons$	$NO(g) + 2H_2O$	+ 0,96
$Hg^{2+} + 2e^-$	$\rightleftharpoons$	$Hg(\ell)$	+ 0,85
$Ag^+ + e^-$	$\rightleftharpoons$	Ag	+ 0,80
$NO_3^- + 2H^+ + e^-$	$\rightleftharpoons$	$NO_2(g) + H_2O$	+ 0,80
$Fe^{3+} + e^-$	$\rightleftharpoons$	Fe^{2+}	+ 0,77
$O_2(g) + 2H^+ + 2e^-$	$\rightleftharpoons$	H_2O_2	+ 0,68
$I_2 + 2e^-$	$\rightleftharpoons$	$2I^-$	+ 0,54
$Cu^+ + e^-$	$\rightleftharpoons$	Cu	+ 0,52
$SO_2 + 4H^+ + 4e^-$	$\rightleftharpoons$	$S + 2H_2O$	+ 0,45
$2H_2O + O_2 + 4e^-$	$\rightleftharpoons$	$4OH^-$	+ 0,40
$Cu^{2+} + 2e^-$	$\rightleftharpoons$	Cu	+ 0,34
$SO_4^{2-} + 4H^+ + 2e^-$	$\rightleftharpoons$	$SO_2(g) + 2H_2O$	+ 0,17
$Cu^{2+} + e^-$	$\rightleftharpoons$	Cu^+	+ 0,16
$Sn^{4+} + 2e^-$	$\rightleftharpoons$	Sn^{2+}	+ 0,15
$S + 2H^+ + 2e^-$	$\rightleftharpoons$	$H_2S(g)$	+ 0,14
$2H^+ + 2e^-$	**$\rightleftharpoons$**	**$H_2(g)$**	**0,00**
$Fe^{3+} + 3e^-$	$\rightleftharpoons$	Fe	– 0,06
$Pb^{2+} + 2e^-$	$\rightleftharpoons$	Pb	– 0,13
$Sn^{2+} + 2e^-$	$\rightleftharpoons$	Sn	– 0,14
$Ni^{2+} + 2e^-$	$\rightleftharpoons$	Ni	– 0,27
$Co^{2+} + 2e^-$	$\rightleftharpoons$	Co	– 0,28
$Cd^{2+} + 2e^-$	$\rightleftharpoons$	Cd	– 0,40
$Cr^{3+} + e^-$	$\rightleftharpoons$	Cr^{2+}	– 0,41
$Fe^{2+} + 2e^-$	$\rightleftharpoons$	Fe	– 0,44
$Cr^{3+} + 3e^-$	$\rightleftharpoons$	Cr	– 0,74
$Zn^{2+} + 2e^-$	$\rightleftharpoons$	Zn	– 0,76
$2H_2O + 2e^-$	$\rightleftharpoons$	$H_2(g) + 2OH^-$	– 0,83
$Cr^{2+} + 2e^-$	$\rightleftharpoons$	Cr	– 0,91
$Mn^{2+} + 2e^-$	$\rightleftharpoons$	Mn	– 1,18
$A\ell^{3+} + 3e^-$	$\rightleftharpoons$	$A\ell$	– 1,66
$Mg^{2+} + 2e^-$	$\rightleftharpoons$	Mg	– 2,36
$Na^+ + e^-$	$\rightleftharpoons$	Na	– 2,71
$Ca^{2+} + 2e^-$	$\rightleftharpoons$	Ca	– 2,87
$Sr^{2+} + 2e^-$	$\rightleftharpoons$	Sr	– 2,89
$Ba^{2+} + 2e^-$	$\rightleftharpoons$	Ba	– 2,90
$Cs^+ + e^-$	$\rightleftharpoons$	Cs	- 2,92
$K^+ + e^-$	$\rightleftharpoons$	K	– 2,93
$Li^+ + e^-$	$\rightleftharpoons$	Li	– 3,05

Increasing oxidising ability/Toenemende oksiderende vermoë ↑

Increasing reducing ability/Toenemende reduserende vermoë ↓

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TABLE 4B: STANDARD REDUCTION POTENTIALS
TABEL 4B: STANDAARD REDUKSIEPOTENSIALE

Increasing oxidising ability/*Toenemende oksiderende vermoë* ↓

Increasing reducing ability/*Toenemende reduserende vermoë* ↑

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
$Cr_2O_7^{2-} + 14H^+ + 6e^-$	⇌	$2Cr^{3+} + 7H_2O$	+ 1,33
$C\ell_2(g) + 2e^-$	⇌	$2C\ell^-$	+ 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

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