education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

PHYSICAL SCIENCES: CHEMISTRY (P2)

SEPTEMBER 2026

MARKS: 150

TIME: 3 hours

This question paper consists 15 pages and 4 data sheets.

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INSTRUCTIONS AND INFORMATIONS

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 the 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.

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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 Which ONE of the following compounds cannot be an ester?

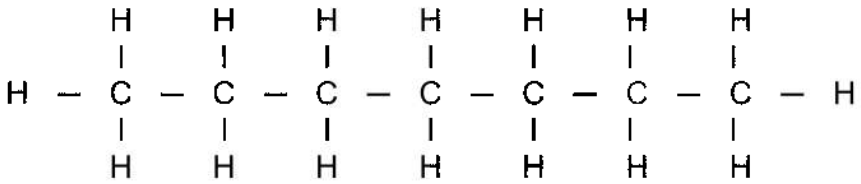
A $C_2H_4O_2$

B $C_3H_6O_2$

C $C_3H_8O_2$

D $C_4H_8O_2$ (2)

1.2 The structural formula of an organic compound is given below:



Which one of the following statements are TRUE?

(i) The compound is a hydrocarbon
(ii) The compound belongs to the same homologous series as methane
(iii) The compound has a higher vapour pressure than methane

A (i) and (ii) only

B (i) and (iii) only

C (ii) and (iii) only

D (i), (ii) and (iii) (2)

1.3 The compound C_3H_6 undergoes the following reaction.

$$C_3H_6(g) + Br_2(\ell) \longrightarrow \mathbf{P}(\ell)$$

Which one of the following combinations CORRECTLY describes the type of reaction and IUPAC name of the compound **P**?

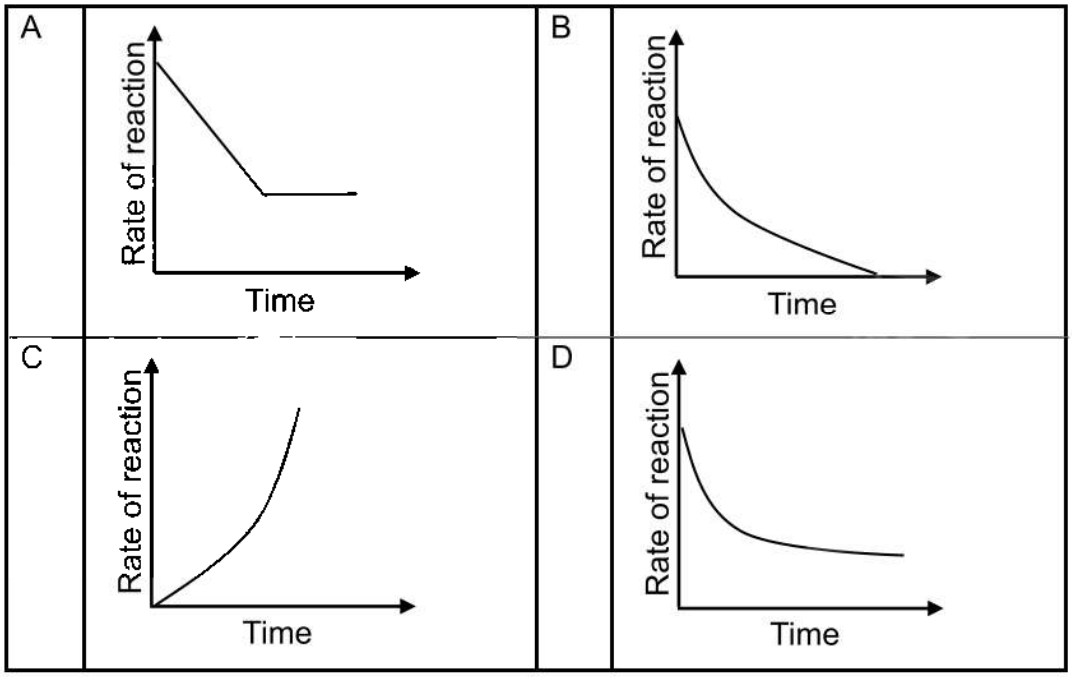
	TYPE OF REACTION	IUPAC NAME
A	Cracking	1-bromopropane
B	Elimination	2-bromopropane
C	Addition	1,2-dibromopropane
D	Addition	1,2-dibromopropene

(2)

1.4 The following is a reaction between excess of hydrochloric acid and powdered magnesium:

$$Mg(s) + 2HC\ell(aq) \longrightarrow MgC\ell_2(aq) + H_2(g)$$

Which ONE of the following graphs CORRECTLY shows the rate of reaction over a period of time?



(2)

1.5 The following chemical reaction reaches equilibrium in a closed container:

$$C(s) + H_2O(g) \rightleftharpoons CO(g) + H_2(g) \quad \Delta H > 0$$

The pressure is increased by decreasing the volume of the container while keeping the temperature constant.

Which ONE of the following combinations is CORRECT for the new equilibrium?

	CONCENTATION OF H_2	**EQUILIBRIUM CONSTANT (K_c)**
A	Increases	Increases
B	Increases	Decreases
C	Remain constant	Remain constant
D	Decreases	Remain constant

(2)

1.6 Consider the following equilibrium reaction.

$$[Cu(H_2O)_6]^{2+}(aq) + C\ell^-(aq) \rightleftharpoons [Cu(H_2O)_5]^+(aq) + H_2O(\ell) \quad \Delta H < 0$$

BLUE **GREEN**

Which ONE of the following will both change the colour of the solution from BLUE to GREEN?

A Add HCℓ and increase the temperature

B Add HCℓ and decrease the temperature

C Add water and increase the temperature

D Add water and decrease the temperature (2)

1.7 Consider the acid base reaction given below:

$$H_2SO_4(aq) + H_2O(\ell) \longrightarrow HSO_4^-(aq) + H_3O^+(aq)$$

Dilute sulphuric acid, H_2SO_4, is gradually added to distilled water.

Which ONE of the following combination correctly describes the pH and pOH of water?

	pH VALUE	**pOH VALUE**
A	Decreases	Increases
B	Increases	Decreases
C	Decreases	Remain constant
D	Remain constant	Remain constant

(2)

1.8 The list of acids is given below:

$HC\ell$	H_2O	H_2S

Which ONE of the following is the CORRECT order of increasing strength of acid?

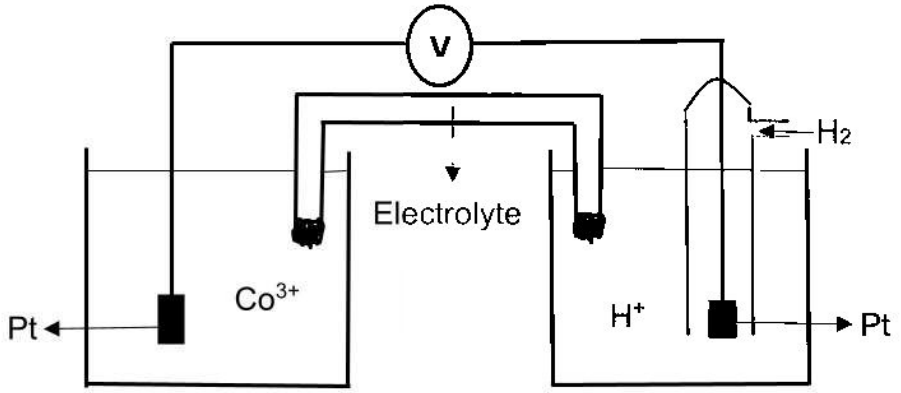
A $H_2O < H_2S < HC\ell$

B $H_2O < HC\ell < H_2S$

C $H_2S < H_2O < HC\ell$

D $HC\ell < H_2S < H_2O$ (2)

1.9 The following is the setup of an electrochemical cell.



Which one of the following is the correct cell notation of the above electrochemical cell?

A Pt , H_2/H^+ // Co^{3+}/Co^{2+}/ Pt

B Pt / H_2/H^+ // Co^{3+},Co^{2+}/ Pt

C Pt / Co^{3+},Co^{2+} // H_2/H^+ / Pt

D Pt / Co^{3+}/Co^{2+} // H_2/H^+ / Pt (2)

1.10 The oxidation number of Cℓ in $HClO_4$ is …

A -1.

B +4.

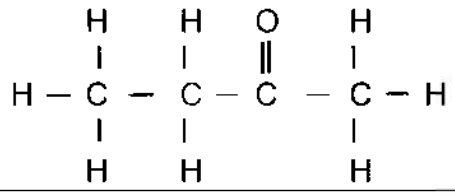
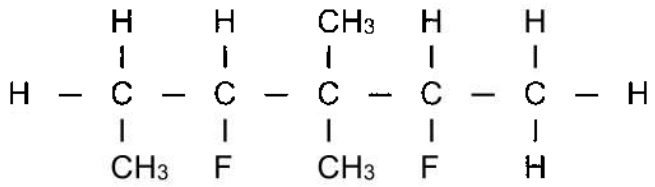
C -7.

D +7. (2)

[20]

QUESTION 2 (Start on a new page.)

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

A	$CH_3(CH_2)_2CHO$	**B**	CH_3CH_2CCH
C		**D**	$CH_3(CH_2)_3OH$
E		**F**	Hexan-3-ol
G	2-methylpropanoic acid	**H**	Ethylpropanoate

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

2.2 Write down the compounds which are functional isomers. (2)

2.3 Write down the NAME of the FUNCTIONAL GROUP to which compound **A** belongs. (1)

2.4 Is compound **F** a primary, secondary or tertiary alcohol?

Give a reason for the answer. (2)

2.5 Write down the:

2.5.1 IUPAC name of compound **B** (2)

2.5.2 IUPAC name of compound **E** (3)

2.5.3 STRUCTURAL FORMULA of compound **G** (2)

2.5.4 STRUCTURAL FORMULA of compound **H** (2)

2.5.5 CONDENSED FORMULA of the positional isomer of compound **D** (2)

[18]

QUESTION 3 (Start on a new page.)

The physical properties of four organic compounds shown in the table below are compared.

	COMPOUND	MOLECULAR MASS ($g \cdot mol^{-1}$)
A	Pentane	72
B	2-Methylbutane	?
C	1-Butanol	74
D	Propanoic acid	74

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

3.2 Write down the molecular mass of compound **B**. (1)

3.3 Compounds **A** and **B** are compared.

3.3.1 Will the boiling point of compound **A** be HIGHER THAN, LOWER THAN or EQUAL TO the boiling point of compound **B**? (1)

3.3.2 Fully explain the answer in QUESTION 3.3.1. (3)

3.4 Compounds **C** and **D** are compared.

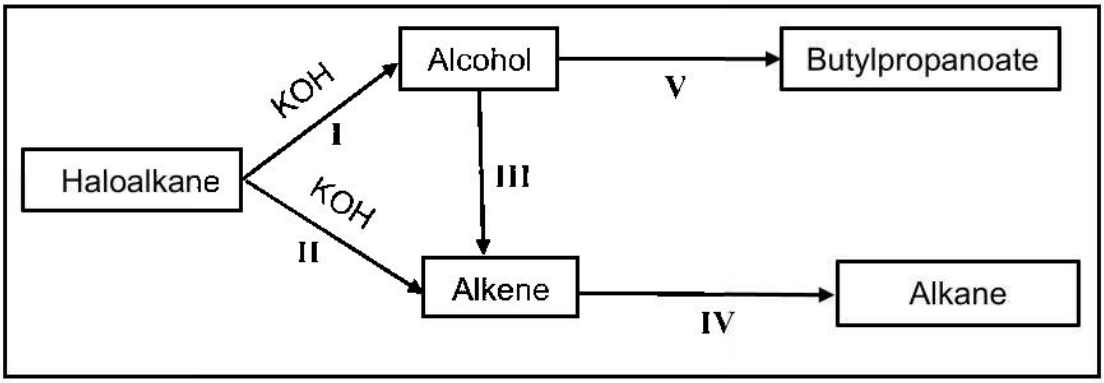
3.4.1 Which compound has the lower vapour pressure? (2)

3.4.2 Fully explain the difference in the boiling points of these compounds. (4)
[13]

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QUESTION 4 (Start on a new page.)

The flow diagram below shows how a primary haloalkane can be used to prepare different organic compounds under different reaction conditions.



Consider reaction **II**

4.1 Write down:

4.1.1 The type of reaction (1)

4.1.2 ONE reaction condition (other than heat) (1)

Reaction **I** is a substitution reaction.

4.2 Write down the:

4.2.1 TYPE of substitution reaction (1)

4.2.2 NAME or FORMULA of the two inorganic products formed (2)

4.3 Write down the balanced equation for reaction **III** using STRUCTURAL FORMULAE. (4)

4.4 Hydrogen is used as a reactant in reaction **IV.**

Write down the:

4.4.1 NAME or FORMULA of the CATALYST used (1)

4.4.2 IUPAC name of the ALKANE (2)

4.4.3 Balanced equation using MOLECULAR FORMULAE for the complete combustion of the alkane (3)

4.5 In reaction **V** the alcohol reacts with carboxylic acid to form butylpropanoate.

Write down the:

4.5.1 Type of reaction (1)

4.5.2 Balanced equation using CONDENSED FORMULAE (5)

[21]

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QUESTION 5 (Start on a new page.)

The reaction between excess diluted HCℓ and pure zinc of mass 10 g is used to investigate how concentration affects the rate of reaction. The balanced equation for the reaction is:

$$Zn(s) + 2HC\ell(aq) \rightarrow ZnC\ell_2(aq) + H_2(g)$$

INVESTIGATION	CONCENTRATION OF HCℓ ($mol \cdot dm^{-3}$)	RATE OF PRODUCTION $H_2(g)$ ($mol \cdot dm^{-3} \cdot s^{-1}$)
1	0,4	2×10^{-2}
2	0,6	$3,8 \times 10^{-2}$
3	0,8	$5,4 \times 10^{-2}$

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

5.2 Describe the trend in the rate of reaction. (1)

5.3 Use the COLLISION THEORY to explain the answer in QUESTION 5.2. (2)

For INVESTIGATION 3

5.4 Calculate the:

5.4.1 Average rate at which HCℓ is used up in $mol \cdot dm^{-3} \cdot s^{-1}$ (2)

5.4.2 Volume of the hydrogen gas produced if the reaction lasts for 3 s. (6)

5.5 The investigation is repeated using 15 g of Zn with excess HCℓ of concentration 0,8 $mol \cdot dm^{-3}$.

Write down INCREASE, DECREASE or REMAIN THE SAME:

5.5.1 Rate of reaction (1)

5.5.2 Volume of hydrogen gas produced (1)

5.6 Explain the answer in QUESTION 5.5.1. (2)
[17]

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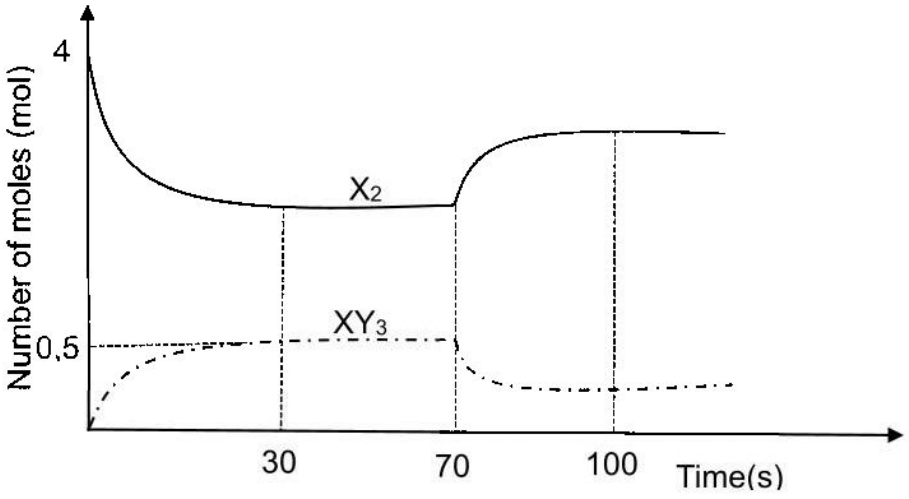
QUESTION 6 (Start on a new page.)

Consider the balanced equation for a hypothetical reversible reaction that takes place when 4 moles of gas X_2 and 4 moles of gas Y_2 are pumped into a 2 dm^3 sealed container.

$$X_2(g) + 3Y_2(g) \rightleftharpoons 2XY_3(g)$$

6.1 Define the term *reversible reaction*. (2)

The graph shows the number of moles of gas X_2 and gas XY_3 from the time the container is sealed.



Use the graph to answer the questions below.

6.2 At 30s, how many moles of XY_3 are formed? (1)

6.3 Calculate the equilibrium constant, K_c at 50s. (7)

6.4 At 70s, the temperature is increased.

6.4.1 Is the forward reaction an EXOTHERMIC or ENDOTHERMIC reaction? (1)

6.4.2 Explain the answer in QUESTION 6.4.1. (3)

6.4.3 Will the K_c value, INCREASE, DECREASE or REMAIN CONSTANT? (1)

[15]

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QUESTION 7 (Start on a new page.)

7.1 Define the term *weak acid*. (2)

7.2 The table below shows aqueous solutions of ionic compounds each with the same concentration at room temperature.

$Na_2CO_3(aq)$	$NaC\ell(aq)$	$NH_4C\ell(aq)$	$CH_3COONa(aq)$

Write down the formula for the:

7.2.1 Neutral solution and explain the answer (2)

7.2.2 Solution with pH less than 7. Use a balanced ionic equation to explain the answer (3)

7.3 In an experiment 300 cm^3 of a 0,1 $mol \cdot dm^{-3}$ solution of sulphuric acid, H_2SO_4, is added to 200 cm^3 of a 0,5 $mol \cdot dm^{-3}$ solution of sodium hydroxide, NaOH, at 25°C. The balanced equation for the reaction is:

$$H_2SO_4(aq) + 2NaOH(aq) \longrightarrow Na_2SO_4(aq) + 2H_2O(aq)$$

Calculate the pH of the final mixture. (8)
[15]

QUESTION 8 (Start on a new page.)

The table below shows two half cells **A** and **B** used to assemble an electrochemical cell under standard conditions.

Half cell A	$Fe^{2+} + 2e^- \rightleftharpoons Fe$
Half cell B	$Ni^{2+} + 2e^- \rightleftharpoons Ni$

8.1 Write down the energy conversion that takes place in the above electrochemical cell. (2)

8.2 In which direction will electrons flow in the external circuit of the above electrochemical cell? (**Ni** to **Fe** or **Fe** to **Ni**) (1)

8.3 Explain the answer to QUESTION 8.2 in terms of the relative strength of reducing agents. (3)

8.4 How will each of the following change when the cell functions normally? Write INCREASES, DECREASES or REMAIN CONSTANT:

8.4.1 The concentration of Ni^{2+} ions (1)

8.4.2 The mass of Fe (1)

8.5 Write down the half reaction to support the answer in QUESTION 8.4.2. (2)

8.6 Write down the balanced net ionic equation for this cell. (3)

8.7 Calculate the initial emf of the cell. (4)

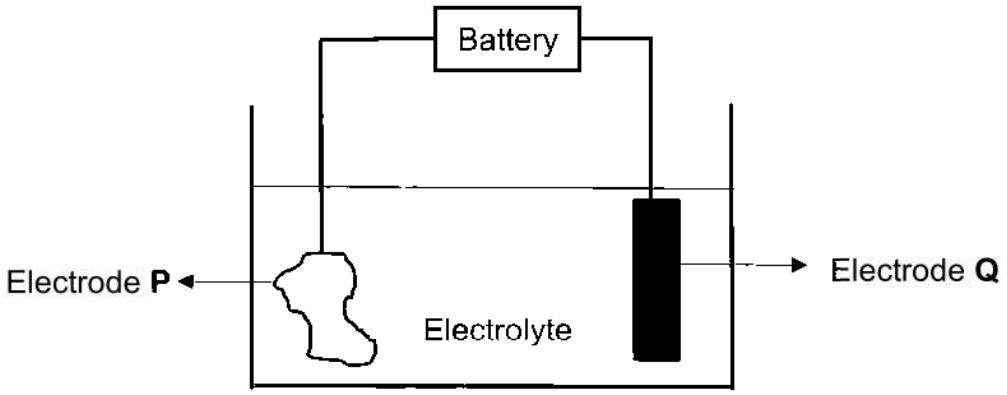
8.8 What will the emf of the cell be when the rate of the forward reaction is equal to the rate of reverse reaction in the cell? (1)

[18]

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QUESTION 9 (Start on a new page.)

The simplified diagram below represents an electrolytic cell used for purification of copper that contains impurities. Electrode **P** is the impure copper.



9.1 Define the term *electrolyte*. (2)

9.2 Write down the NAME or FORMULA of the electrolyte used in the electrochemical cell. (1)

9.3 Is the impure copper metal the ANODE or CATHODE?

Give a reason for the answer. (2)

9.4 Write down the half reaction that takes place at electrode **Q**. (2)

9.5 Calculate the mass of copper deposited at the cathode when 1,5 A of current is delivered by the battery in 20 minutes. (6)
[13]

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

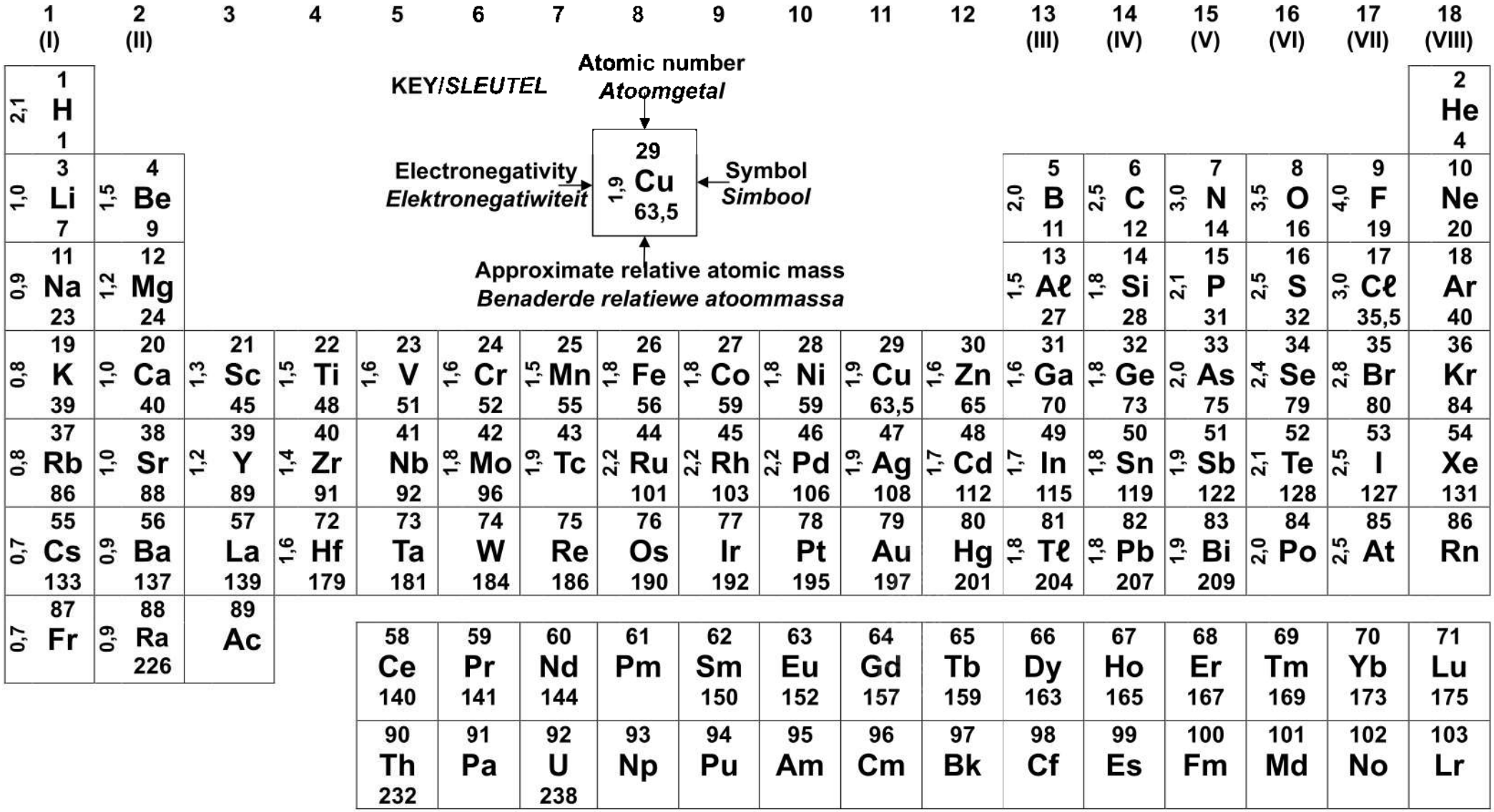
NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Standard pressure *Standaarddruk*	p^{θ}	$1{,}013 \times 10^5$ Pa
Molar gas volume at STP *Molêre gasvolume by STD*	V_m	22,4 $dm^3 \cdot mol^{-1}$
Standard temperature *Standaardtemperatuur*	T^{θ}	273 K
Charge on electron *Lading op elektron*	e	$-1{,}6 \times 10^{-19}$ 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* $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$
$\frac{c_a v_a}{c_b v_b} = \frac{n_a}{n_b}$	$pH = -\log[H_3O^+]$
$K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}$ at/*by* 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* $E^{\theta}_{cell} = E^{\theta}_{oxidising\ agent} - E^{\theta}_{reducing\ agent}$ / $E^{\theta}_{sel} = E^{\theta}_{oksideermiddel} - E^{\theta}_{reduseermiddel}$	
$I = \frac{Q}{\Delta t}$	$n = \frac{Q}{q_e}$ where n is the number of electrons/ waar n die aantal elektrone is

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TABLE 3: THE PERIODIC TABLE OF ELEMENTS
TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE1



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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 strength of oxidising agents/*Toenemende sterkte van oksideermiddels*

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

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

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

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

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

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