



KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**PROVINCIAL STANDARDISED
ASSESSMENT**

GRADE 12

PHYSICAL SCIENCES P2 (CHEMISTRY)

PREPARATORY EXAMINATION

SEPTEMBER 2026

MARKS: 150

TIME: 3 HOURS

This question paper consists of 13 pages and 4 data sheets.

INSTRUCTIONS AND INFORMATION

1. Write your name 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 sub-questions, for example between QUESTION 2.1 and 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 et cetera where required.
11. You are advised to use the attached DATA SHEETS.
12. Write neatly and legibly.

QUESTION 1

Four possible options are provided as answers to the following questions. Each question has only one correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.10) on the answer sheet.

1.1 Which ONE of the compounds below is an aldehyde?

- A CH_3COCH_3
- B $\text{CH}_3\text{CH}_2\text{COOH}$
- C $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- D $\text{CH}_3\text{CH}_2\text{CHO}$ (2)

1.2 Which ONE of the following compounds is a tertiary alcohol?

- A 3-methylhexan-1-ol
- B 2-methylhexan-3-ol
- C 2-methylhexan-2-ol
- D 3-methylhexan-2-ol (2)

1.3 Which ONE of the following compounds has the LOWEST vapour pressure under the same conditions?

A	$\begin{array}{cccc} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} - \text{H} \\ & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$	B	$\begin{array}{ccc} & \text{H} & \text{H} & \text{O} \\ & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} \\ & & & \\ & \text{H} & \text{H} & \text{H} \end{array}$
C	$\begin{array}{cccc} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} - \text{O} - \text{H} \\ & & & \\ & \text{H} & \text{H} & \text{H} \end{array}$	D	$\begin{array}{ccc} & \text{H} & \text{O} - \text{H} \\ & & \\ \text{H} & - \text{C} & - \text{C} \\ & & \\ & \text{H} & \text{O} \end{array}$

(2)

1.4 A compound $\text{CH}_3(\text{CH}_2)_5\text{CH}_3$ undergoes the following reaction:

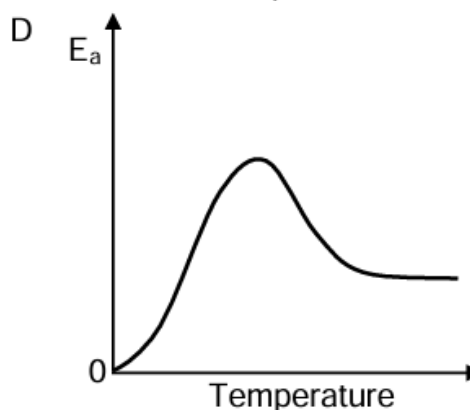
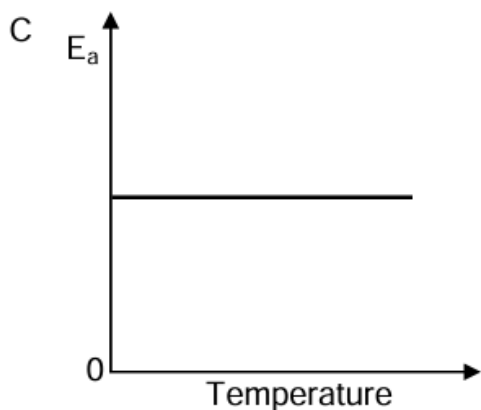
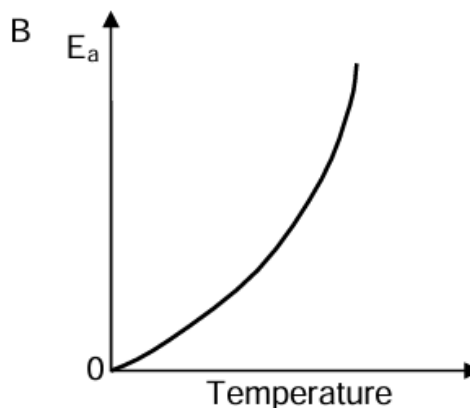
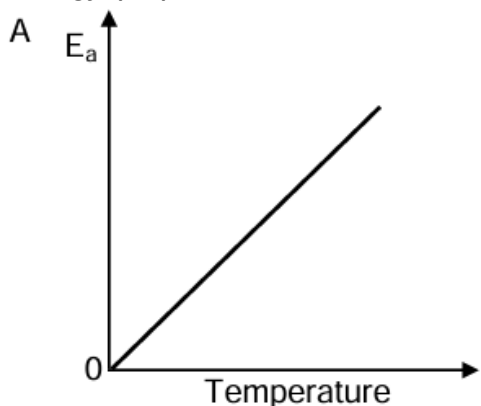


Which ONE of the following combinations CORRECTLY describes the type of reaction and the IUPAC name of compound **R**?

	TYPE OF REACTION	IUPAC NAME
A	Elimination	Propane
B	Addition	Propene
C	Cracking	Propane
D	Cracking	Propene

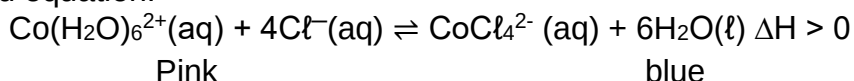
(2)

1.5 Which ONE of the following graphs shows the relationship between activation energy (E_a) of a reaction and temperature?



(2)

1.6 A reaction reaches equilibrium at 25 °C in a flask according to the following balanced equation:



Which ONE of the following will change the colour of the mixture from pink to blue?

- A Adding $\text{NH}_4\text{Cl}(\text{aq})$
- B Adding water
- C Adding $\text{NaOH}(\text{aq})$
- D Cooling the flask

(2)

- 1.7 Dilute nitric acid is added to distilled water at 25 °C.
How will this affect the hydronium ion concentration $[H_3O^+]$ and the ionisation constant (K_w) of water at 25 °C?

	$[H_3O^+]$	K_w
A	Decreases	Increases
B	Increases	Remains the same
C	Remains the same	Increases
D	Increases	decreases

(2)

- 1.8 In a galvanic (voltaic) cell, electrons move from the ...

- A anode to the cathode in the external circuit.
- B cathode to the anode in the external circuit.
- C anode to the cathode through the salt bridge.
- D cathode to the anode through the salt bridge.

(2)

- 1.9 Which ONE of the following redox reactions is SPONTANEOUS under standard conditions?

- A $Br_2(aq) + 2Cl^-(aq) \rightarrow 2Br^-(aq) + Cl_2(g)$
- B $2Fe^{3+}(aq) + 2I^-(aq) \rightarrow 2Fe^{2+}(aq) + I_2(g)$
- C $Ni^{2+}(aq) + H_2(g) \rightarrow Ni(s) + 2H^+(aq)$
- D $Cu(s) + Pb^{2+}(aq) \rightarrow Cu^{2+}(aq) + Pb(s)$

(2)

- 1.10 A concentrated sodium chloride solution ($NaCl$) undergoes electrolysis in an electrolytic cell. The product(s) formed at the cathode is/are:

- A H_2 and OH^-
- B O_2 and H^+
- C Na
- D Cl_2

(2)

[20]

QUESTION 2 (Start on a new page)

The letters A to F in the table below represent six organic compounds.

A	$\text{CH} \equiv \text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$	B	$\text{CH}_3\text{CH}_2\text{CH}_2\underset{\text{OH}}{\text{CH}}\text{CH}_3$
C	$\text{CH}_2 = \underset{\text{CH}_3}{\text{C}} - \overset{\text{CH}_3}{\text{CH}_2}$	D	Pentanoic acid
E	$ \begin{array}{ccccccc} & \text{H} & & \text{H} & & \text{H} & & \text{O} \\ & & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} - \text{H} \\ & & & & & & & \\ & \text{H} & & \text{H} - \text{C} - \text{H} & & \text{H} & & \\ & & & & & & & \\ & & & \text{H} & & & & \end{array} $	F	$\text{CH}_3 - \text{CH}_2 - \text{O} - \overset{\text{O}}{\underset{ }{\text{C}}} - \text{CH}_2 - \text{CH}_3$

2.1 Write down the letter(s) that represent(s) each of the following:

2.1.1 A compound with a hydroxyl group. (1)

2.1.2 A compound with the general formula $\text{C}_n\text{H}_{2n-2}$. (1)

2.1.3 TWO compounds that have the same molecular formula but different functional groups. (2)

2.2 Write down:

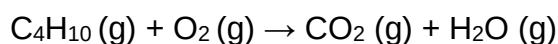
2.2.1 The IUPAC name of compound C. (2)

2.2.2 The homologous series to which compound E belongs. (1)

2.2.3 The structural formula of a SINGLE-BRANCHED chain isomer of compound D. (3)

2.3 A group of campers on a mountain uses a portable gas stove fuelled by butane (C_4H_{10}). The temperature and pressure on the mountain are 20°C and 90 kPa, respectively.

Butane gas is burnt in EXCESS oxygen according to the following unbalanced chemical equation:



2.3.1 Write down the NAME of the reaction taking place. (1)

2.3.2 Balance the chemical equation above. (2)

2.3.3 Calculate the volume of butane gas that will be required to produce 5 dm^3 of carbon dioxide gas at 20°C and 90 kPa. (3)

[16]

QUESTION 3 (Start on a new page)

Learners investigate factors that influence the boiling points of organic compounds. The boiling points of some organic compounds obtained are shown in the table below.

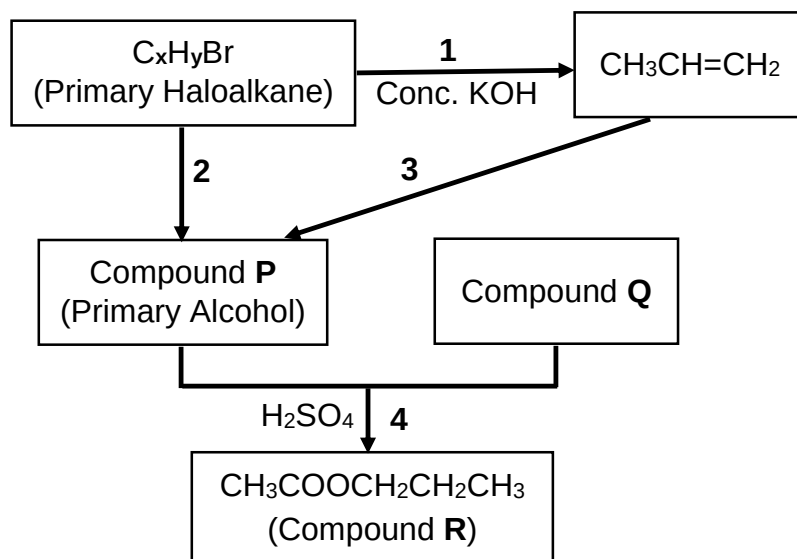
	COMPOUND	MOLECULAR MASS (g.mol ⁻¹)	BOILING POINT (°C)
A	Propane	44	-42
B	Butane	58	-0,5
C	Pentane	72	36
D	2-methylbutane	72	28
E	Ethanal	44	X
F	Ethanol	46	78

- 3.1 Define the term *boiling point*. (2)
- 3.2 Consider compounds A, B, and C.
- 3.2.1 To which homologous series do compounds A, B, and C belong? (1)
- 3.2.2 Explain the difference in Boiling points between compounds A, B, and C by referring to the relative strength of Intermolecular forces. (3)
- 3.2.3 Which ONE of the compounds A, B, and C has the LOWEST vapour pressure? Give a reason for your answer. (2)
- 3.3 Compounds C and D have the same molecular formula but different structural formulae.
- 3.3.1 Distinguish between a *molecular formula* and a *structural formula*. (2)
- 3.3.2 What TYPE of Isomers are compounds C and D?
Choose from POSITIONAL, CHAIN, or FUNCTIONAL GROUP. (1)
- 3.3.3 Referring to their structural formulae, give a reason why compound C has a higher boiling point than compound D. (1)
- 3.4 The boiling point of compound A is – 42 °C while that of compound E is X.
- 3.4.1 Write down the condensed structural formula of compound E. (1)
- 3.4.2 How does the boiling point of compound E compare to the boiling point of compound A?
Write down HIGHER THAN, LOWER THAN, or EQUAL TO. (1)
- 3.4.3 Fully explain your answer in 3.4.2. (3)
- [17]**

QUESTION 4 (Start on a new page)

Study the flow diagram below.

1, 2, 3, and 4 represent Chemical reactions.



4.1 Define the term *Primary haloalkane*. (2)

4.2 For Reaction **1**, write down:

4.2.1 The TYPE of reaction taking place. (1)

4.2.2 In addition to using concentrated alcoholic KOH, what other condition is necessary for this reaction? (1)

4.2.3 The values of **x** and **y** in C_xH_yBr . (2)

4.2.4 Formulae of INORGANIC products formed. (2)

4.3 Reaction **3** is an addition reaction.

4.3.1 What TYPE of Addition reaction is reaction **3**? (1)

4.3.2 Write down the IUPAC name of Compound **P**. (1)

4.3.3 Is compound **P** the MAJOR or MINOR product of reaction **3**? (1)

4.4 In reaction **4**, compound **P** reacts with compound **Q** in the presence of concentrated Sulphuric acid (H_2SO_4) to form compound **R**.

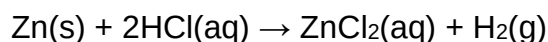
4.4.1 To which homologous series does compound **Q** belong? (1)

4.4.2 Write down the balanced chemical equation, using structural formulae, for reaction **4**. (4)
[16]

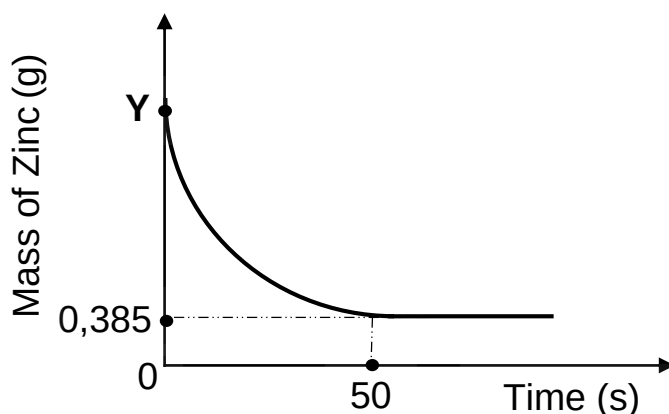
QUESTION 5 (Start on a new page)

An unknown mass of Zinc granules is added to a dilute hydrochloric acid solution in a conical flask at room temperature.

The balanced chemical equation of the reaction taking place is:



The graph below shows the change in mass of the zinc granule as they react with the acid.



The temperature of the reaction mixture increases as the reaction progresses.

5.1 Is the reaction above EXOTHERMIC or ENDOTHERMIC? Give a reason. (2)

5.2 Why is the graph horizontal after 50 seconds? (1)

5.3 Define *reaction rate*. (2)

5.4 How will the rate of this reaction be affected if POWDERED Zinc was used instead of Zinc granules?
Write down INCREASES, DECREASES, or REMAINS THE SAME. (1)

5.5 Use the Collision theory to explain your answer in Question 5.4. (3)

The volume of Hydrogen gas collected after 50 seconds is 0,168 dm³. Take the molar volume of gas at room temperature as 24 dm³.mol⁻¹.

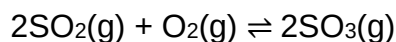
5.6 Calculate the value of Y shown on the graph. (6)

5.7 Calculate the rate at which Zinc reacts in g.s⁻¹. (3)

[18]

QUESTION 6 (Start on a new page)

During the contact process, Sulphur dioxide (SO₂) reacts with Oxygen (O₂) to form Sulphur trioxide (SO₃) according to the following balanced chemical equation:



Initially, **X** mol SO₂(g) and 6 mol O₂(g) are sealed in a 2 dm³ container, and the system is allowed to reach its first equilibrium at 450 °C.

It is found that the concentration of O₂ at this equilibrium is 1,5 mol.dm⁻³.

6.1 Explain why chemical equilibrium is considered *dynamic*. (2)

6.2 The pressure of the system is increased by decreasing the volume of the container, while the temperature is kept constant.

6.2.1 Which reaction will be favoured as a result of the pressure increase? Write FORWARD or REVERSE. Give a reason. (2)

6.2.2 How will the K_c value be affected by the increase in pressure? Write INCREASES, DECREASES, or REMAINS THE SAME. (1)

6.3 A new equilibrium is reached at the same temperature of 450 °C. The second equilibrium concentrations are as follows:

[SO₂] = 1,7888 mol.dm⁻¹; [O₂] = 1,2 mol.dm⁻¹ and [SO₃] = 2,4 mol.dm⁻¹.

Calculate the number of moles of SO₂, **X**, that was initially placed in the container. (9)

6.4 When the temperature is decreased, the equilibrium constant (K_c) increases.

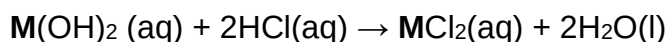
6.4.1 State *Le Chatelier's principle*. (2)

6.4.2 Is the forward reaction EXOTHERMIC or ENDOTHERMIC?
Explain your answer in terms of Le Chatelier's principle. (3)

[19]

QUESTION 7 (Start on a new page)

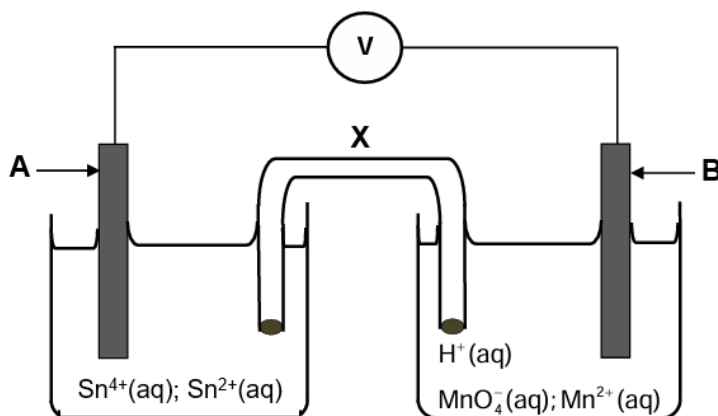
A laboratory assistant prepares a solution by dissolving 10,26 g of an unknown Group II metal hydroxide, $M(OH)_2$, and making the solution up to 600 cm³ in a volumetric flask. During an experiment, 37,5 cm³ of this standard solution is mixed with 22,5 cm³ HCl solution of concentration 0,4 mol.dm⁻³. The balanced chemical equation is as follows:



- 7.1 Define an *Arrhenius base*. (2)
- 7.2 Give a reason why HCl is classified as a strong acid. (1)
- 7.3 Calculate the number of moles of HCl. (3)
- 7.4 The resulting solution at the end of the reaction has a pH of 1,602.
- 7.4.1 Which reactant, $M(OH)_2$ or HCl, was the limiting reagent?
Give a reason for your answer. (2)
- 7.4.2 Use calculations to identify metal **M**. (9)
- [17]**

QUESTION 8 (Start on a new page)

The diagram below shows a Galvanic cell that operates under standard conditions. **A** and **B** are Carbon rods.

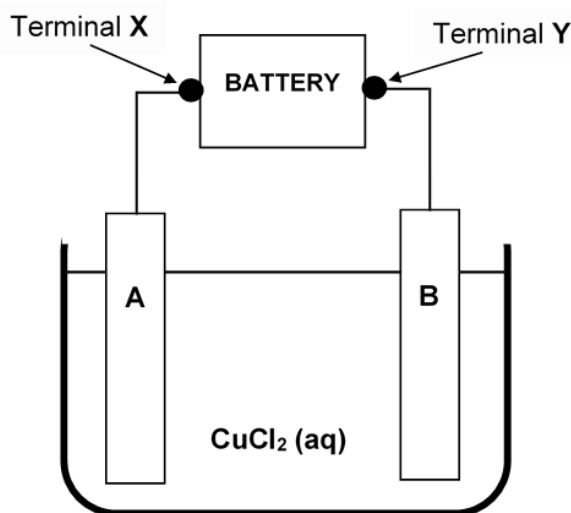


- 8.1 State the energy conversion taking place in this cell. (1)
- 8.2 Write down ONE function of component **X**. (1)
- 8.3 Which electrode, **A** or **B**, is the Cathode? (1)
- 8.4 For this cell, write down:
- 8.4.1 The formula of the reducing agent. (1)
- 8.4.2 The reduction half-reaction. (2)
- 8.4.3 The cell notation. (3)
- 8.5 Calculate the cell potential of the above cell. (4)
- 8.6 The concentration of Sn^{4+} ions is increased.
How will this change affect the following? Write down INCREASES, DECREASES, or REMAINS THE SAME.
- 8.6.1 The size of electrode **A**. (1)
- 8.6.2 The voltmeter reading. (2)

[16]

QUESTION 9 (Start on a new page)

Copper chloride solution ($\text{CuCl}_2(\text{aq})$) is used as an electrolyte in the copper purification process as shown in the diagram below.



- 9.1 Define the term *Electrolysis*. (2)
- 9.2 Is the reaction taking place in this cell EXOTHERMIC or ENDOTHERMIC? (1)
- 9.3 It is observed that the mass of electrode **B** decreases while the cell is in operation.
- 9.3.1 Which terminal, **X** or **Y**, is the negative terminal of the battery? (1)
- 9.3.2 Which electrode is pure copper? Write down **A** or **B**. (1)
- 9.3.3 Write down the half-reaction taking place at electrode **A**. (2)
- 9.4 One major change is now made to this cell: The two electrodes, **A** and **B**, are replaced with two CARBON rods.
- 9.4.1 How will the concentration of copper ions in the electrolyte be affected while the cell is in operation?
Write down INCREASES, DECREASES, or REMAINS THE SAME. (1)
- 9.4.2 Write down the NAME or FORMULA of the gas that will be formed at the Anode. (1)
- 9.4.3 Write down a half-reaction to support your answer in question 9.4.2. (2)

[11]**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	$1,013 \times 10^5 \text{ Pa}$
Molar gas volume at STP Molêre gasvolume by STD	V_m	$22,4 \text{ dm}^3 \cdot \text{mol}^{-1}$
Standard temperature Standaardtemperatuur	T^θ	273 K
Charge on electron Lading op elektron	e	$-1,6 \times 10^{-19} \text{ C}$
Avogadro's constant Avogadro-konstante	N_A	$6,02 \times 10^{23} \text{ mol}^{-1}$

TABLE 2: FORMULAE/TABEL 2: FORMULES

$n = \frac{m}{M}$	$n = \frac{N}{N_A}$
$c = \frac{n}{V}$ or/of $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$
$\frac{c_a V_a}{c_b V_b} = \frac{n_a}{n_b}$	$\text{pH} = -\log[\text{H}_3\text{O}^+]$
$K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ at/by } 298 \text{ K}$	
$E_{\text{cell}}^\theta = E_{\text{cathode}}^\theta - E_{\text{anode}}^\theta / E_{\text{sel}}^\theta = E_{\text{katode}}^\theta - E_{\text{anode}}^\theta$ or/of $E_{\text{cell}}^\theta = E_{\text{reduction}}^\theta - E_{\text{oxidation}}^\theta / E_{\text{sel}}^\theta = E_{\text{reduksie}}^\theta - E_{\text{oksidasie}}^\theta$ or/of $E_{\text{cell}}^\theta = E_{\text{oxidisingagent}}^\theta - E_{\text{reducingagent}}^\theta / E_{\text{sel}}^\theta = E_{\text{oksideermiddel}}^\theta - E_{\text{reduseermiddel}}^\theta$	
$I = \frac{Q}{\Delta t}$	$n = \frac{Q}{e}$ where n is the number of electrons/ waar n die aantal elektrone is

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

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 1 H																	2 4 He
3 7 Li	4 9 Be											5 11 B	6 12 C	7 14 N	8 16 O	9 19 F	10 20 Ne
11 23 Na	12 24 Mg											13 27 Al	14 28 Si	15 31 P	16 32 S	17 35,5 Cl	18 40 Ar
19 39 K	20 40 Ca	21 45 Sc	22 48 Ti	23 51 V	24 52 Cr	25 55 Mn	26 56 Fe	27 59 Co	28 59 Ni	29 63,5 Cu	30 65 Zn	31 70 Ga	32 73 Ge	33 75 As	34 79 Se	35 80 Br	36 84 Kr
37 86 Rb	38 88 Sr	39 89 Y	40 91 Zr	41 92 Nb	42 96 Mo	43 Tc	44 101 Ru	45 103 Rh	46 106 Pd	47 108 Ag	48 112 Cd	49 115 In	50 119 Sn	51 122 Sb	52 128 Te	53 127 I	54 131 Xe
55 133 Cs	56 137 Ba	57 139 La	72 179 Hf	73 181 Ta	74 184 W	75 186 Re	76 190 Os	77 192 Ir	78 195 Pt	79 197 Au	80 201 Hg	81 204 Tl	82 207 Pb	83 209 Bi	84 Po	85 At	86 Rn
87 Fr	88 226 Ra	89 Ac															
			58 140 Ce	59 141 Pr	60 144 Nd	61 Pm	62 150 Sm	63 152 Eu	64 157 Gd	65 159 Tb	66 163 Dy	67 165 Ho	68 167 Er	69 169 Tm	70 173 Yb	71 175 Lu	
			90 232 Th	91 Pa	92 238 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

KEY/SLEUTEL

Atomic number
*Atoomgetal*Electronegativity
*Elektronegatiwiteit*Symbol
*Simbool*Approximate relative atomic mass
Benaderde relatiewe atoommassa

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

Increasing strength of oxidising agents/Toenemende sterkte van oksideermiddels

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
$Cl_2(g) + 2e^- \rightleftharpoons 2Cl^-$	+ 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
$Br_2(l) + 2e^- \rightleftharpoons 2Br^-$	+ 1,07
$NO_3^- + 4H^+ + 3e^- \rightleftharpoons NO(g) + 2H_2O$	+ 0,96
$Hg^{2+} + 2e^- \rightleftharpoons Hg(l)$	+ 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
$Al^{3+} + 3e^- \rightleftharpoons Al$	- 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 reducing agents/Toenemende sterkte van reduseermiddels

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

Half-reactions/Halfreaksies	E^{θ} (V)
$\text{Li}^{+} + \text{e}^{-} \rightleftharpoons \text{Li}$	- 3,05
$\text{K}^{+} + \text{e}^{-} \rightleftharpoons \text{K}$	- 2,93
$\text{Cs}^{+} + \text{e}^{-} \rightleftharpoons \text{Cs}$	- 2,92
$\text{Ba}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Ba}$	- 2,90
$\text{Sr}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Sr}$	- 2,89
$\text{Ca}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Ca}$	- 2,87
$\text{Na}^{+} + \text{e}^{-} \rightleftharpoons \text{Na}$	- 2,71
$\text{Mg}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Mg}$	- 2,36
$\text{Al}^{3+} + 3\text{e}^{-} \rightleftharpoons \text{Al}$	- 1,66
$\text{Mn}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Mn}$	- 1,18
$\text{Cr}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Cr}$	- 0,91
$2\text{H}_2\text{O} + 2\text{e}^{-} \rightleftharpoons \text{H}_2(\text{g}) + 2\text{OH}^{-}$	- 0,83
$\text{Zn}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Zn}$	- 0,76
$\text{Cr}^{3+} + 3\text{e}^{-} \rightleftharpoons \text{Cr}$	- 0,74
$\text{Fe}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Fe}$	- 0,44
$\text{Cr}^{3+} + \text{e}^{-} \rightleftharpoons \text{Cr}^{2+}$	- 0,41
$\text{Cd}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Cd}$	- 0,40
$\text{Co}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Co}$	- 0,28
$\text{Ni}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Ni}$	- 0,27
$\text{Sn}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Sn}$	- 0,14
$\text{Pb}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Pb}$	- 0,13
$\text{Fe}^{3+} + 3\text{e}^{-} \rightleftharpoons \text{Fe}$	- 0,06
$2\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{H}_2(\text{g})$	0,00
$\text{S} + 2\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{H}_2\text{S}(\text{g})$	+ 0,14
$\text{Sn}^{4+} + 2\text{e}^{-} \rightleftharpoons \text{Sn}^{2+}$	+ 0,15
$\text{Cu}^{2+} + \text{e}^{-} \rightleftharpoons \text{Cu}^{+}$	+ 0,16
$\text{SO}_4^{2-} + 4\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{SO}_2(\text{g}) + 2\text{H}_2\text{O}$	+ 0,17
$\text{Cu}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Cu}$	+ 0,34
$2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^{-} \rightleftharpoons 4\text{OH}^{-}$	+ 0,40
$\text{SO}_2 + 4\text{H}^{+} + 4\text{e}^{-} \rightleftharpoons \text{S} + 2\text{H}_2\text{O}$	+ 0,45
$\text{Cu}^{+} + \text{e}^{-} \rightleftharpoons \text{Cu}$	+ 0,52
$\text{I}_2 + 2\text{e}^{-} \rightleftharpoons 2\text{I}^{-}$	+ 0,54
$\text{O}_2(\text{g}) + 2\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{H}_2\text{O}_2$	+ 0,68
$\text{Fe}^{3+} + \text{e}^{-} \rightleftharpoons \text{Fe}^{2+}$	+ 0,77
$\text{NO}_3^{-} + 2\text{H}^{+} + \text{e}^{-} \rightleftharpoons \text{NO}_2(\text{g}) + \text{H}_2\text{O}$	+ 0,80
$\text{Ag}^{+} + \text{e}^{-} \rightleftharpoons \text{Ag}$	+ 0,80
$\text{Hg}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Hg}(\text{l})$	+ 0,85
$\text{NO}_3^{-} + 4\text{H}^{+} + 3\text{e}^{-} \rightleftharpoons \text{NO}(\text{g}) + 2\text{H}_2\text{O}$	+ 0,96
$\text{Br}_2(\text{l}) + 2\text{e}^{-} \rightleftharpoons 2\text{Br}^{-}$	+ 1,07
$\text{Pt}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Pt}$	+ 1,20
$\text{MnO}_2 + 4\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{Mn}^{2+} + 2\text{H}_2\text{O}$	+ 1,23
$\text{O}_2(\text{g}) + 4\text{H}^{+} + 4\text{e}^{-} \rightleftharpoons 2\text{H}_2\text{O}$	+ 1,23
$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^{+} + 6\text{e}^{-} \rightleftharpoons 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$	+ 1,33
$\text{Cl}_2(\text{g}) + 2\text{e}^{-} \rightleftharpoons 2\text{Cl}^{-}$	+ 1,36
$\text{MnO}_4^{-} + 8\text{H}^{+} + 5\text{e}^{-} \rightleftharpoons \text{Mn}^{2+} + 4\text{H}_2\text{O}$	+ 1,51
$\text{H}_2\text{O}_2 + 2\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons 2\text{H}_2\text{O}$	+ 1,77
$\text{Co}^{3+} + \text{e}^{-} \rightleftharpoons \text{Co}^{2+}$	+ 1,81
$\text{F}_2(\text{g}) + 2\text{e}^{-} \rightleftharpoons 2\text{F}^{-}$	+ 2,87

Increasing strength of oxidising agents/Toenemende sterkte van oksideermiddels

Increasing strength of reducing agents/Toenemende sterkte van reduceermiddels