Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2013

PHYSICAL SCIENCES P2 CHEMISTRY

MARKS: **150**

TIME: **3 hours**

This question paper consists of 17 pages, including 4 data sheets and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

1. Write your full NAME and SURNAME (and/or examination number if applicable) in the appropriate spaces on the ANSWER SHEET and ANSWER BOOK.

2. Answer ALL the questions.

3. This question paper consists of TWO sections:

   SECTION A: 25 marks
   SECTION B: 125 marks

4. Answer SECTION A on the attached ANSWER SHEET and SECTION B in the ANSWER BOOK.

5. Non-programmable calculators may be used.

6. Appropriate mathematical instruments may be used.

7. Number your answers correctly according to the numbering system used in this question paper.

8. Data Sheets and a Periodic Table are attached for your use.

9. Wherever motivations, discussions, etc. are required, be brief.

SECTION A

Answer this section on the attached ANSWER SHEET.

QUESTION 1: ONE-WORD ITEMS

Give ONE word/term for EACH of the following descriptions. Write only the word/term next to the question number (1.1−1.5) on the ANSWER SHEET.

1.1 The type of chemical bond which is formed when the electronegativity difference is greater than 2.1 (1)

1.2 According to the VSEPR theory, a phosphorus pentachloride ($PC\ell_5$) molecule will have this shape (1)

1.3 The substance that will be used up totally during a chemical reaction (1)

1.4 A proton (H^+) acceptor in an acid-base reaction (1)

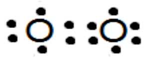
1.5 The process during gold production where the thickened slurry is pumped to leach tanks and sodium cyanide solution is added to dissolve the gold (1)

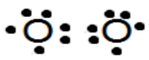
[5]

QUESTION 2: MULTIPLE-CHOICE QUESTIONS

Four possible options are provided as answers to the following questions. Each question has only ONE correct answer. Choose the answer and make a cross (X) on the correct block (A–D) next to the question number (2.1–2.10) in the ANSWER SHEET.

2.1 Identify the Lewis diagram below which is the CORRECT way to represent an oxygen molecule:

A 

B 

C 

D 

(2)

2.2 Which of the following bonds will be the most polar?

A HF
B NO
C HCℓ
D OF

(2)

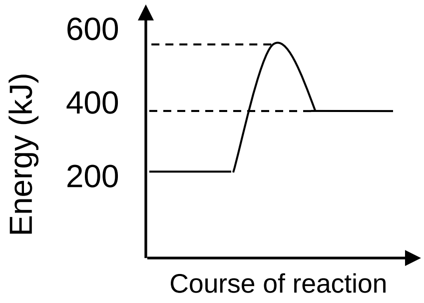
2.3 1 litre of water contains … water molecules.

A 1 mol
B $6{,}02\times10^{23}$
C $3{,}34\times10^{25}$
D $18{,}0\times10^{24}$ (2)

2.4 According to the VSEPR theory, the shape of a sulphur hexafluoride (SF_6) molecule is …

A trigonal bipyramidal.
B octahedral.
C trigonal pyramidal.
D tetrahedral. (2)

The graph which follows represents the change in potential energy for a certain reaction. Answer QUESTIONS 2.5 and 2.6 by referring to this graph.



2.5 Which of the following statements concerning this graph is INCORRECT?

A More energy is absorbed than released.
B More energy is released than absorbed.
C The reactants have less energy than the products.
D The products have more energy than the reactants. (2)

2.6 Which combination is CORRECT for this reaction?

	Type of reaction	Activation energy (kJ)
A	Endothermic	200
B	Exothermic	400
C	Endothermic	400
D	Exothermic	200

(2)

2.7 Identify the conjugate acid of HSO_4^-.

A H_2SO_4
B OH^-
C H_3O^+
D SO_4^- (2)

2.8 Indicate which ONE of the following reactions is a redox reaction:

A $AgC\ell\ (s) \longrightarrow Ag^+\ (aq) + C\ell^-\ (aq)$
B $Cu^{2+}\ (aq) + 2NO_3^-\ (aq) \longrightarrow Cu(NO_3)_2$
C $2Na\ (s) + C\ell_2\ (g) \longrightarrow 2NaC\ell\ (s)$
D $Pb(NO_3)_2\ (aq) + 2KI\ (aq) \longrightarrow PbI_2\ (s) + 2KNO_3\ (aq)$ (2)

2.9 During the final process of gold extraction zinc is used. The purpose of the zinc during this chemical reaction is to act as a(n) …

A dehydrating agent.
B oxidising agent.
C reducing agent.
D catalyst. (2)

2.10 Identify the source of energy which is non-renewable.

A Geothermal heat
B Coal
C Sunlight
D Ocean tides (2)

[20]

TOTAL SECTION A: 25

SECTION B

INSTRUCTIONS AND INFORMATION

1. Answer this section in the ANSWER BOOK.
2. Start each question on a NEW page.
3. Leave one line between two subsections, for example between QUESTIONS 3.1 and 3.2.
4. The formulae and substitutions must be shown in ALL calculations.
5. Round off your answers to TWO decimal places.

QUESTION 3 (Start on a new page.)

Consider the substances below and answer the questions which follow:

CO_2 (g), $CCℓ_4$ (ℓ), CH_4 (g), HCℓ (g), C (s), NH_3 (g)

3.1 Give the Lewis structure for $CCℓ_4$. (2)

3.2 According to the VSEPR theory, what shapes will the $CCℓ_4$ and CO_2 molecules have respectively? (2)

3.3 Name the intermolecular force found between the CH_4 molecules. (1)

3.4 Identify the gaseous substances which have polar covalent bonds between the atoms, but the molecule as a whole is non-polar. (2)

3.5 Explain why you chose the substances in QUESTION 3.4. (2)

3.6 Which substance has the strongest covalent bonds between the atoms? (1)

3.7 Which substance has the strongest intermolecular forces? (1)

[11]

QUESTION 4 (Start on a new page.)

When compared with other liquids, water has some unique physical properties. It has a high specific heat capacity and a high heat of vaporisation but it has a low viscosity. Water acts as a solvent for other substances.

4.1 Name the forces (found between the H_2O molecules) that are responsible for the high specific heat capacity and heat of vaporisation of water. (1)

4.2 Define the term "*heat of vaporisation*". (1)

4.3 Draw a Lewis structure for H_2O. (2)

4.4 Use the Lewis diagram in QUESTION 4.3 (and the VSEPR theory) to predict the shape of a water molecule. (1)

4.5 Are water molecules polar or non-polar? Explain your answer. (4)

4.6 Which ONE of the two substances, $KC\ell$ or I_2, will be able to dissolve in water? Give a reason for your answer. (3)

4.7 Water is able to move up narrow glass tubes. Name and explain this phenomenon. (3)
[15]

QUESTION 5 (Start on a new page.)

During the summer season in South Africa, many homeowners have to maintain their swimming pools to keep it crystal clear. Sometimes, especially after heavy storms, it is necessary to add "settling salts" to the pool to get it clear again. The "settling salts" combines with the dirt and algae to form a sludge, which settles at the bottom of the pool. The sludge can then be hand vacuumed to leave the water clear again. "Settling salts" is a common name for aluminium sulphate.

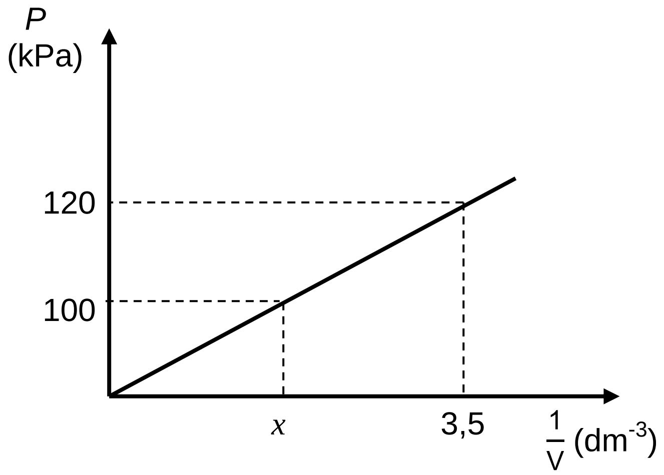
5.1 Give the FORMULA for aluminium sulphate. (1)

5.2 Calculate the percentage composition of aluminium sulphate. (4)

5.3 Determine the empirical formula for aluminium sulphate. (5)
[10]

QUESTION 6 (Start on a new page.)

6.1 A group of learners investigated the relationship between the pressure and volume of an enclosed gas. The graph of the pressure against the reciprocal of volume, which follows, was obtained from the results:



6.1.1 Give an investigative question for this investigation. (2)

6.1.2 Give a hypothesis for this investigation. (2)

6.1.3 Name TWO variables which must be constant during this investigation. (2)

6.1.4 Calculate the value of x on the graph. (6)

6.1.5 Name and state in words the law that is being investigated here. (2)

6.1.6 Use the graph above to express this law mathematically. (1)

6.1.7 Redraw the above graph as a sketch graph (no coordinates needed). Label this graph A. On the same set of axes, draw a graph to show what would happen if the temperature was decreased. Label this graph B. (2)

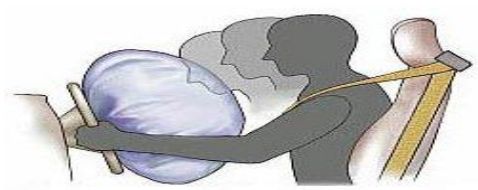
6.2 Vehicle manufacturers specify that the tyres of a certain vehicle must be filled with air to 180 kPa (approximately 2 bars) before a long journey. A group of students are not aware of this and decide to inflate the tyres to 3 bars. This ensures that the tyres are nice and rigid (stiff) before going on a journey from Port Elizabeth to Pretoria.

Explain, using proper scientific reasoning, why it is dangerous to inflate a vehicle's tyres until they are rigid, before a long journey. (7)

[24]

QUESTION 7 (Start on a new page)

Since the introduction of airbags in the 1980s, many lives have been saved in motor vehicle accidents. Most modern cars are equipped with airbags for the driver and the front passenger. It takes about 30–40 milliseconds for an air bag to deploy (that is faster than you can blink!), while a typical car collision lasts for about 0,125 s.



During a collision, an electrical signal is sent to a sodium azide capsule (found inside the air bag) which decomposes rapidly to generate a large amount of nitrogen gas according to the following reaction:

$$2NaN_3\ (s) \longrightarrow 2Na\ (s) + 3N_2\ (g) \qquad \Delta H < 0$$

7.1 Assume the temperature of nitrogen gas remains constant during a collision. Calculate the mass of N_2 (g) that will be needed to inflate an air bag to a volume of 70 dm^3 at 23 °C and 101,5 kPa. (8)

7.2 In the above reaction, will the products have more or less energy than the reactant? Give a reason for your answer. (2)

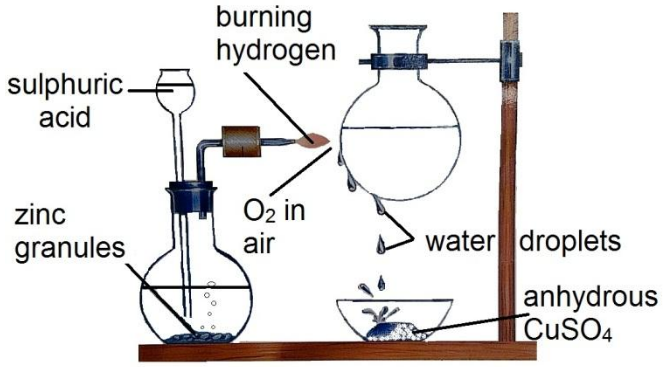
7.3 A student driving a car at 180 $km \cdot h^{-1}$ says to his friend: "I don't have to wear a seatbelt, the airbag will save me."

Name ONE situation in which this statement can be proven wrong. (2)

[12]

QUESTION 8 (Start on a new page.)

When hydrogen is burned in oxygen, water vapour (steam) is formed.



Assume 25 g of hydrogen is burned in an excess of oxygen to yield 140 g of steam.

8.1 Write a balanced equation for the above reaction. (3)

8.2 Identify the limiting reagent in the reaction. Give a reason for your answer. (2)

8.3 Calculate the percentage yield of steam for the above reaction. (8)
[13]

QUESTION 9 (Start on a new page.)

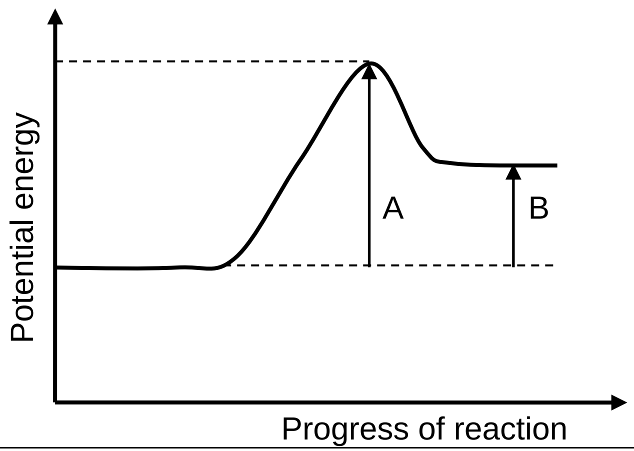
Plants manufacture their own food through the process of photosynthesis by making use of water, carbon dioxide and sunlight (energy). The balanced equation for this reaction is:

$$6CO_2\ (g) + 6H_2O\ (\ell) \rightarrow C_6H_{12}O_6\ (s) + 6O_2\ (g) \qquad \Delta H > 0$$

The food gives the plants (and animals which eat it) energy to perform their daily life functions. The food is broken down during cellular respiration in the presence of oxygen to release the energy according to the following equation:

$$C_6H_{12}O_6\ (s) + 6O_2\ (g) \rightarrow 6CO_2\ (g) + 6H_2O\ (\ell) \qquad \Delta H < 0$$

The graph which follows represents the change in potential energy for one of the two reactions listed above.



9.1 Is the process of photosynthesis an example of an ENDOTHERMIC or EXOTHERMIC reaction? Give a reason for your answer. (2)

9.2 Does the above graph represent the change in potential energy for PHOTOSYNTHESIS or CELLULAR RESPIRATION? Briefly explain how you got to the answer you chose. (3)

9.3 Supply labels for **A** and **B** which appear on the graph. (2)

9.4 The reaction for cellular respiration is catalysed by enzymes. Explain how the enzymes will influence the rate of the reaction. (2)

[9]

QUESTION 10 (Start on a new page.)

Consider the two acid-base reactions below and answer the questions which follow:

(i) $HC\ell\ (aq) + H_2O\ (\ell) \rightarrow C\ell^-\ (aq) + H_3O^+\ (aq)$

(ii) $H_2O\ (\ell) + NH_3\ (aq) \rightarrow NH_4^+\ (aq) + OH^-\ (aq)$

10.1 Define the term *ampholyte* and identify the substance which acts as an ampholyte in the above reactions. (3)

10.2 Identify the conjugate acid-base pairs in equation (i). (2)

10.3 In a laboratory, one beaker contains a solution involving reaction (i) and another beaker contains a solution involving reaction (ii). A learner wants to test the solutions to determine whether they are acidic or alkaline.

10.3.1 Give the general term for any substance that can be used by the learner to test if the solutions are acidic or alkaline. (1)

10.3.2 Which ONE of the two solutions will have a pH below 7? Give a reason for your answer. (3)

10.4 If $HC\ell$ (g) should react with NH_3 (g) in a sealed container, a salt will be formed. Give the NAME and FORMULA of the salt that is formed. (2)

[11]

QUESTION 11 (Start on a new page.)

Consider the following chemical equation which represents a reaction between sulphur dioxide and oxygen:

$$SO_2\ (g) + O_2\ (g) \rightarrow SO_3\ (g)$$

11.1 Give the oxidation number for sulphur in SO_2 and SO_3. (2)

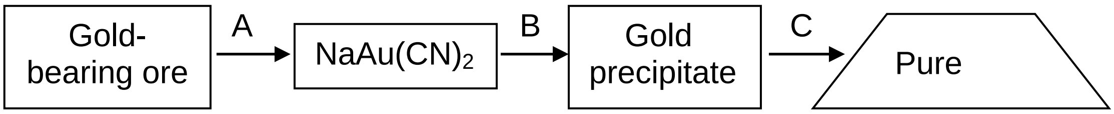
11.2 Did the sulphur undergo OXIDATION or REDUCTION? (1)

11.3 Is sulphur the OXIDISING AGENT or REDUCING AGENT? Refer to the oxidation number to justify your answer. (2)

[5]

QUESTION 12 (Start on a new page.)

12.1 Gold was mined as early as 1200 AD in South Africa. Today, South Africa is a world leader in the mining and processing of gold. The following flow diagram illustrates some of the most important steps in the mining and processing of gold:



12.1.1 Identify the process which takes place at **C**. (1)

12.1.2 Give the NAME or FORMULA of the chemical substance that was used at **B** originally. (1)

12.1.3 Which chemical substance is now preferred at **B** and why is this substance preferred? (2)

12.1.4 The recovery of gold through the cyanidation process has positive and negative effects. Give ONE negative effect of the use of cyanide. (2)

12.1.5 Give ONE reason why gold is important to our country. (2)

12.2 Various fossil fuels are the main sources of energy on Earth.

12.2.1 Why are fossil fuels referred to as non-renewable energy sources? (2)

12.2.2 Name the fossil fuel which is used as the main source of energy in South Africa. (1)

12.2.3 Give TWO reasons why South Africa uses the energy source mentioned in QUESTION 12.2.2. (2)

12.2.4 Give ONE reason why it is necessary to introduce renewable energy resources. (2)

[15]

TOTAL SECTION B: 125

GRAND TOTAL: 150

NATIONAL SENIOR CERTIFICATE
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DATA FOR PHYSICAL SCIENCES GRADE 11
PAPER 2 (CHEMISTRY)

GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 11
VRAESTEL 2 (CHEMIE)

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

NAAM/*NAME*	**SIMBOOL/*SYMBOL***	**WAARDE/*VALUE***
Avogadro's constant *Avogadro-konstante*	N_A	$6{,}02\times10^{23}\ mol^{-1}$
Molar gas constant *Molêre gaskonstante*	R	$8{,}31\ J\cdot K^{-1}\cdot mol^{-1}$
Standard pressure *Standaarddruk*	p^{θ}	$1{,}013\times10^{5}\ Pa$
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

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

$\frac{p_1V_1}{T_1}=\frac{p_2V_2}{T_2}$	$pV = nRT$
$\frac{c_av_a}{c_bv_b}=\frac{n_a}{n_b}$	$c=\frac{n}{V}=\frac{m}{MV}$
$n=\frac{m}{M}=\frac{V}{V_m}=\frac{N}{N_A}$	

TABLE 3: THE PERIODIC TABLE OF ELEMENTS/*TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE* TABLE 4A: STANDARD REDUCTION POTENTIALS

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

Halfreaksies/*Half-reactions*			E^{θ} (V)
$F_2(g) + 2e^-$	⇌	$2F^-$	+ 2,87
$Co^{3+} + e^-$	⇌	Co^{2+}	+ 1,81
$H_2O_2 + 2H^+ + 2e^-$	⇌	$2H_2O$	+1,77
$MnO_4^- + 8H^+ + 5e^-$	⇌	$Mn^{2+} + 4H_2O$	+ 1,51
$C\ell_2(g) + 2e^-$	⇌	$2C\ell^-$	+ 1,36
$Cr_2O_7^{2-} + 14H^+ + 6e^-$	⇌	$2Cr^{3+} + 7H_2O$	+ 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
$\mathbf{2H^+ + 2e^-}$	⇌	$\mathbf{H_2(g)}$	**0,00**
$Fe^{3+} + 3e^-$	⇌	Fe	− 0,06
$Pb^{2+} + 2e^-$	⇌	Pb	− 0,13
$Sn^{2+} + 2e^-$	⇌	Sn	− 0,14
$Ni^{2+} + 2e^-$	⇌	Ni	− 0,27
$Co^{2+} + 2e^-$	⇌	Co	− 0,28
$Cd^{2+} + 2e^-$	⇌	Cd	− 0,40
$Cr^{3+} + e^-$	⇌	Cr^{2+}	− 0,41
$Fe^{2+} + 2e^-$	⇌	Fe	− 0,44
$Cr^{3+} + 3e^-$	⇌	Cr	− 0,74
$Zn^{2+} + 2e^-$	⇌	Zn	− 0,76
$2H_2O + 2e^-$	⇌	$H_2(g) + 2OH^-$	− 0,83
$Cr^{2+} + 2e^-$	⇌	Cr	− 0,91
$Mn^{2+} + 2e^-$	⇌	Mn	− 1,18
$A\ell^{3+} + 3e^-$	⇌	$A\ell$	− 1,66
$Mg^{2+} + 2e^-$	⇌	Mg	− 2,36
$Na^+ + e^-$	⇌	Na	− 2,71
$Ca^{2+} + 2e^-$	⇌	Ca	− 2,87
$Sr^{2+} + 2e^-$	⇌	Sr	− 2,89
$Ba^{2+} + 2e^-$	⇌	Ba	− 2,90
$Cs^+ + e^-$	⇌	Cs	- 2,92
$K^+ + e^-$	⇌	K	− 2,93
$Li^+ + e^-$	⇌	Li	− 3,05

Increasing oxidising ability/*Toenemende oksiderende vermoë*

Increasing reducing ability/*Toenemende reduserende vermoë*

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

Increasing oxidising ability/*Toenemende oksiderende vermoë*

Halfreaksies/*Half-reactions*			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

Increasing reducing ability/*Toenemende reduserende vermoë*

PHYSICAL SCIENCES PAPER 2 (CHEMISTRY)
FISIESE WETENSKAPPE VRAESTEL 2 (CHEMIE)

ANSWER SHEET/*ANTWOORDBLAD*

NAME/*NAAM*: ………………………………………….. **GRADE/ *GRAAD*:** ..……..

SECTION A/*AFDELING A*

QUESTION 1: ONE-WORD ITEMS/*VRAAG 1: EENWOORD-ITEMS*

1.1 ………………………………………………………….. (1)

1.2 ………………………………………………………….. (1)

1.3 ………………………………………………………….. (1)

1.4 ………………………………………………………….. (1)

1.5 ………………………………………………………….. (1)
[5]

QUESTION 2: MULTIPLE-CHOICE QUESTIONS/
VRAAG 2: MEERVOUDIGEKEUSE-VRAE

2.1	A	B	C	D
2.2	A	B	C	D
2.3	A	B	C	D
2.4	A	B	C	D
2.5	A	B	C	D
2.6	A	B	C	D
2.7	A	B	C	D
2.8	A	B	C	D
2.9	A	B	C	D
2.10	A	B	C	D

(10 x 2) **[20]**

TOTAL SECTION A/*TOTAAL AFDELING A*: 25