Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2011

PHYSICAL SCIENCES P2

MARKS: **150**

TIME: **3 hours**

* P H S C E 2 *

This question paper consists of 11 pages, four data sheets, graph paper and one answer sheet.

INSTRUCTIONS AND INFORMATION

1. Write your full name and surname (and/ or exam 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 formed as the product of a Lewis acid-base reaction. (1)

1.2 Iron which is extracted from a blast furnace and still contains impurities. (1)

1.3 A type of chemical reaction which gives out energy in the form of heat or light. (1)

1.4 A chemical substance which changes colour when it is added to an acid or base. (1)

1.5 Compounds which are made up of only carbon and hydrogen atoms bonded with each other. (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 best answer and make a cross (**X**) in the appropriate block next to the question number (2.1 − 2.10) on the ANSWER SHEET.

2.1 The minimum amount of energy that colliding particles (atoms, molecules or ions) must have for a reaction to start.

A Ionisation energy.
B Activation energy.
C Lattice energy.
D Bond energy. (2)

2.2 The relationship between the pressure and volume of a gas, at constant temperature, is known as …

A Charles' Law.
B Gay-Lussac's Law.
C Boyle's Law.
D Avogadro's Law. (2)

2.3 A Brønsted acid is a(n) ...

A electron donor.
B proton acceptor.
C electron acceptor.
D proton donor. (2)

2.4 In the chemical equation: H_2 (g) + $C\ell_2$ (g) → 2HCℓ (g), the **H_2** is the ...

A oxidising agent because it is oxidised.
B oxidising agent because it is reduced.
C reducing agent because it is oxidised.
D reducing agent because it is reduced. (2)

2.5 Which ONE of the following compounds can undergo an addition reaction?

A CH_3CH_3.
B CH_2CH_2.
C $CH_3C\ell$.
D CH_4. (2)

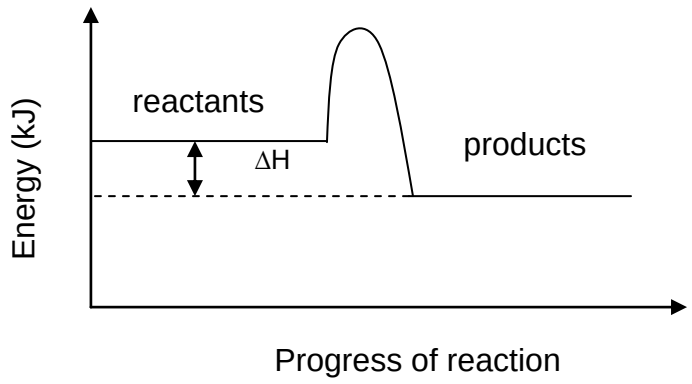
2.6 The number of atoms in 2 mol of O_2 is ...

A 2.41×10^{24}.
B 3.2×10^{23}.
C 32.
D 44,8. (2)

2.7 The oxidation number of N in the formula HNO_3 is ...

A +3.
B -5.
C +5.
D -7. (2)

2.8 Consider the following graph which represents a change in energy during a chemical reaction.



ΔH in this reaction is ...

A negative, since energy is gained.
B positive, since energy is gained.
C positive, since energy is lost.
D negative, since energy is lost. (2)

2.9 One of the negative effects of large amounts of traffic on the environment is …

A smog.
B eutrofication.
C radioactivity.
D none of the above. (2)

2.10 Greenhouse gases absorb energy in the infrared region of the spectrum. Which ONE of the following is classified as a greenhouse gas?

A nitrogen.
B nitrous oxide.
C oxygen.
D hydrogen. (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

Hydrogen reacts with oxygen and forms water according to the following equation:

$$2H_2 (g) + O_2 (g) \rightarrow 2H_2O (\ell) \qquad \Delta H < 0$$

3.1 Write Lewis structures for each of the following:

3.1.1 An oxygen atom. (1)

3.1.2 A water molecule. (2)

3.2 What shape does a water molecule have? (1)

3.3 Is the above reaction, endothermic or exothermic? Give a reason for your answer. (1 + 2) (3)

3.4 Sketch a well labelled graph to show the energy changes as the reaction progresses. Indicate the energy of the reactants and products on your graph. (4)

3.5 Is the water molecule polar or non-polar? Explain your answer. (1 + 4) (5)

3.6 Name the force that exists between water molecules in the liquid phase. (1)

3.7 What name is given to the energy absorbed or released when bonds are formed or broken? (1)

3.8 The information in the table coincides with the above reaction. Use the information supplied to answer the questions which follow:

H — H	436 $kJ \cdot mol^{-1}$
O = O	499 $kJ \cdot mol^{-1}$
O — H	460 $kJ \cdot mol^{-1}$

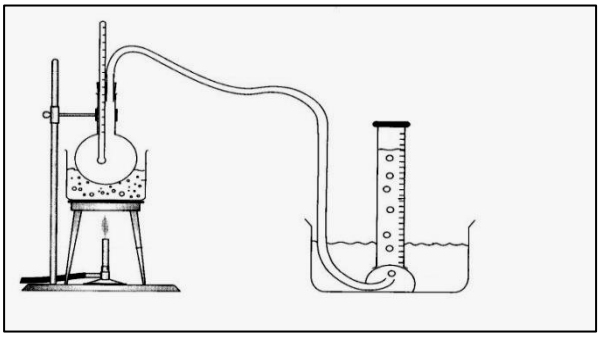
3.8.1 Calculate the total energy needed to break the existing bonds. (2)

3.8.2 Calculate the total energy needed to form the new bonds. (2)

[22]

QUESTION 4

4.1 Learners set up the apparatus, as shown below, to investigate the relationship between volume and temperature:



The learners take readings at regular intervals of the temperature of the air in the 250 cm^3 round bottomed flask and the volume of air in the measuring cylinder. The following results were obtained:

Reading	**Temperature t (°C)**	**Volume of air in measuring cylinder V (cm^3)**
1	45	10
2	50	15
3	59	20
4	66	25

4.1.1 Formulate an investigative question for this investigation. (2)

4.1.2 Refer to the table above. Convert the temperature to K and calculate the total volume of air for the **first reading**. (2)

4.1.3 Express the relationship between volume and Kelvin temperature mathematically. (2)

4.1.4 Identify the dependent variable? (1)

4.1.5 Plot a graph (on graph paper) of *Kelvin Temperature*, on the x-axis against *Total Volume of Air*, on the y-axis. Extrapolate the graph to zero volume. (5)

4.2 Aerosol (spray) cans have a warning on them which says: *Do not expose to temperatures higher than 50 °C*. A boy ignores this warning and throws an "empty" spray can into the fire. Before the can is thrown in the fire, it has a pressure of 110 kPa at 25 °C. The volume of the can is 125 cm^3. Assume the volume and pressure of the can increases to 135 cm^3 and 230 kPa respectively. At what temperature (in °C) will the can explode? (5)

4.3 Calculate the temperature (in °C) of 3 moles of hydrogen gas which is kept in a 200 dm^3 container at a pressure of 70 kPa. (6)

[23]

QUESTION 5

5.1 Oxalic acid is a salt which has the formula $(COOH)_2.2H_2O$ before it is dissolved in water. A group of learners want to make a standard solution of oxalic acid (formula: $(COOH)_2$) with a concentration of 0,1 $mol \cdot dm^{-3}$.

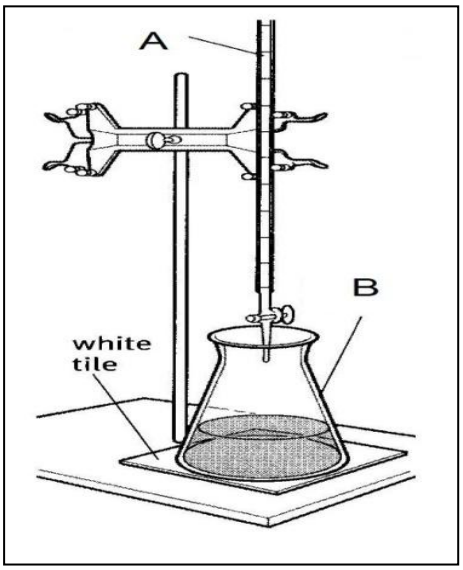
5.1.1 What is a standard solution? (2)

5.1.2 What type of flask is needed to make a standard solution? (1)

5.1.3 The learners use a flask (as referred to in QUESTION 5.1.2) with a volume of 250 cm^3. What mass of oxalic acid is needed to obtain the desired concentration? (5)

5.1.4 Is oxalic acid a strong acid or a weak acid? Give a reason for your answer. (1 + 2) (3)

5.2 The same group of learners mentioned in QUESTION 5.1 now want to use the standard solution of oxalic acid to help them determine the concentration of a sodium hydroxide solution. They set up the apparatus as shown below.



5.2.1 Name the apparatus labelled A and B respectively. (2)

5.2.2 Name ONE other apparatus, not shown in the diagram, which is needed for this investigation. (2)

5.3 During the above investigation, the sodium hydroxide (NaOH) reacts with the oxalic acid $(COOH)_2$ to produce a salt and water. Write a balanced chemical equation for the reaction between sodium hydroxide and oxalic acid. (3)

5.4 What is the household name for sodium hydroxide? (2)

[20]

QUESTION 6

A naturally occurring chemical reaction is the corrosion of iron. Iron reacts very slowly with oxygen to produce iron(III) oxide. In the presence of water, the process occurs a little faster.

6.1 Write a balanced equation for the reaction between iron and oxygen. (3)

6.2 What type of reaction takes place here? (2)

6.3 Iron(III) oxide has a reddish-brown colour. What is the common name for iron(III) oxide? (1)

6.4 Give the oxidation number for oxygen as an element before the reaction. (1)

6.5 Now give the oxidation number for oxygen in the compound iron (III) oxide. (1)

6.6 Did the oxygen undergo oxidation or reduction? (2)

6.7 What do you understand by the term oxidation? (2)

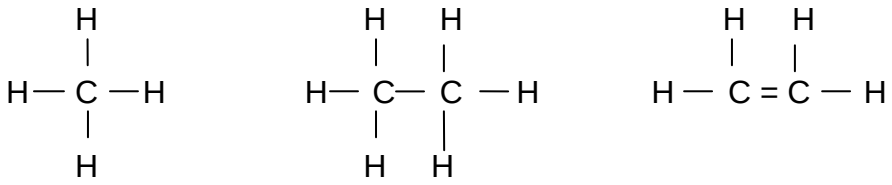
6.8 Identify the reducing agent in the above reaction. (2)

6.9 Name TWO ways of protecting iron from the process of corrosion. (2 + 2) (4)

[18]

QUESTION 7

7.1 Consider the following compounds:



A **B** **C**

7.1.1 Name the homologous series to which compound B belongs. (2)

7.1.2 Give the IUPAC name for compound C. (2)

7.1.3 Which ONE of the above compounds is an unsaturated hydrocarbon? Write only A, B or C as your answer. (2)

7.1.4 Compound A reacts with chlorine gas in the presence of ultraviolet light. Use structural formulae to write a balanced equation for this reaction. (4)

7.1.5 What type of reaction (addition, substitution or elimination) takes place in QUESTION 7.1.4? (2)

7.1.6 Compound C reacts with hydrogen. Give the *structural formula* **and** *name* of the compound which is formed as the product of this reaction. (2 + 2) (4)

7.1.7 What type of reaction takes place in QUESTION 7.1.6? (2)

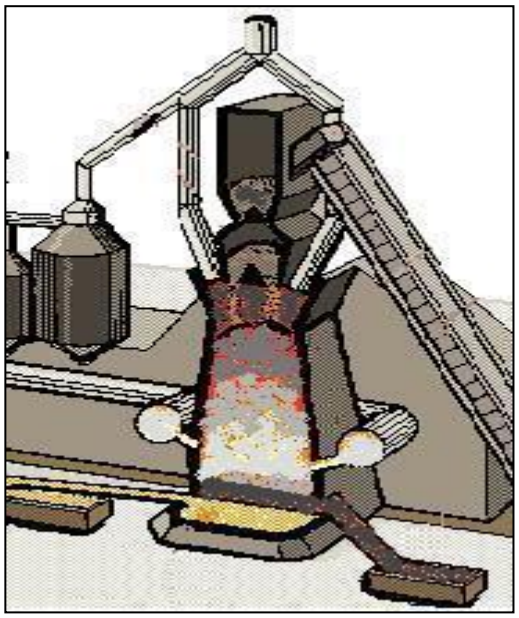
7.1.8 Which household product is manufactured industrially by the type of reaction referred to in QUESTIONS 7.1.6 and 7.1.7? (2)

7.1.9 Saturated hydrocarbons are cracked to produce more useful unsaturated products. Is cracking an example of an addition, substitution or elimination reaction? (2)

[22]

QUESTION 8

South Africa has large reserves of iron. Iron has been mined and smelted by indigenous people in Southern Africa for hundreds of years. These people used very simple furnaces to extract the iron from its ore. Today, iron is produced from iron oxide, which is the most common ore available. A blast furnace (pictured below), which is a very tall structure, is used today to produce iron on a large scale. The iron oxide is reduced in the blast furnace by making use of coke (carbon).



The following questions are based on the extraction of iron from its ore:

8.1 Name the major impurity in iron ore. (1)

8.2 The coke mentioned above reacts with oxygen to produce carbon monoxide. The iron oxide then reacts with the carbon monoxide to produce the iron and carbon dioxide.

8.2.1 Write a balanced equation for the reaction that produces the iron. (3)

8.2.2 In what state (solid, liquid or gas) does the iron leave the blast furnace? (1)

8.3 Mention ONE way in which the production of iron has a negative impact on the environment. (2)

8.4 Some of the iron formed from the blast furnace is mixed with other substances to produce steel which is much stronger than the iron formed initially. Name ONE way in which steel is used in our everyday lives. (1)

8.5 A calcium silicate ($CaSiO_3$) layer, called slag, is formed on top of the iron. When solidified, slag forms one of the main ingredients of a substance used in the building industry. Name this substance. (2)

[10]

QUESTION 9

Consider the following terms which are "buzz words", not only for environmentalists, but also for politicians, academics and anyone interested in conserving the earth for future generations.

Global warming, greenhouse effect, greenhouse gases, carbon footprint, climate change, ozone layer

9.1 Name any TWO gases that are regarded as greenhouse gases. (2)

9.2 What is the greenhouse effect? (2)

9.3 Climate change is a more general consequence of global warming. Name ONE, more specific, negative effect (consequence) of global warming. (1)

9.4 Name ONE way in which you can reduce your carbon footprint. (1)

9.5 What is the role of the ozone layer in the stratosphere **and** in what way does it benefit us as human beings?

9.6 What agreement was signed in recent years by most nations of the world, agreeing to reduce their emissions of greenhouse gases? (2)

[10]

TOTAL SECTION B: 125

GRAND TOTAL: 150

NATIONAL SENIOR CERTIFICATE EXAMINATION
NASIONALE SENIOR SERTIFIKAAT-EKSAMEN

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*

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Avogadro's constant *Avogadro-konstante*	N_A	$6{,}02 \times 10^{23}\ mol^{-1}$
Molar gas constant *Molêre gaskonstante*	R	$8{,}31\ J{\cdot}K^{-1}{\cdot}mol^{-1}$
Standard pressure *Standaarddruk*	p^{θ}	$1{,}013 \times 10^{5}\ Pa$
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

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

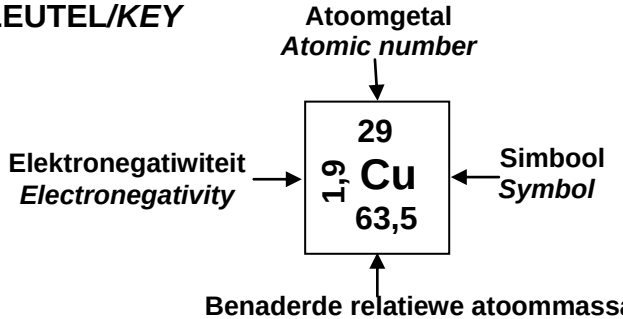
$\frac{p_1V_1}{T_1}=\frac{p_2V_2}{T_2}$	$pV=nRT$
$n=\frac{m}{M}$	$c=\frac{n}{V}$
$c=\frac{m}{MV}$	$\frac{n_a}{n_b}=\frac{c_a\,V_a}{c_b\,V_b}$

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

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)
2,1 1 H 1																	2 He 4
1,0 3 Li 7	1,5 4 Be 9											2.0 5 B 11	2.5 6 C 12	3.0 7 N 14	3.5 8 O 16	4.0 9 F 19	10 Ne 20
0,9 11 Na 23	1,2 12 Mg 24											1.5 13 Aℓ 27	1.8 14 Si 28	2.1 15 P 31	2.5 16 S 32	3.0 17 Cℓ 35,5	18 Ar 40
0,8 19 K 39	1,0 20 Ca 40	1,3 21 Sc 45	1,5 22 Ti 48	1,6 23 V 51	1,6 24 Cr 52	1,5 25 Mn 55	1,8 26 Fe 56	1,8 27 Co 59	1,8 28 Ni 59	1,9 29 Cu 63,5	1,6 30 Zn 65	1,6 31 Ga 70	1,8 32 Ge 73	2,0 33 As 75	2,4 34 Se 79	2,8 35 Br 80	36 Kr 84
0,8 37 Rb 86	1,0 38 Sr 88	1,2 39 Y 89	1,4 40 Zr 91	41 Nb 92	1,8 42 Mo 96	1,9 43 Tc	2,2 44 Ru 101	2,2 45 Rh 103	2,2 46 Pd 106	1,9 47 Ag 108	1,7 48 Cd 112	1,7 49 In 115	1,8 50 Sn 119	1,9 51 Sb 122	2,1 52 Te 128	2,5 53 I 127	54 Xe 131
0,7 55 Cs 133	0,9 56 Ba 137	57 La 139	1,6 72 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	1,8 81 Tℓ 204	1,8 82 Pb 207	1,9 83 Bi 209	2,0 84 Po	2,5 85 At	86 Rn
0,7 87 Fr	0,9 88 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

SLEUTEL/*KEY*



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

Halfreaksies / *Half-reactions*	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

Toenemende oksiderende vermoë/*Increasing oxidising ability*

Toenemende reduserende vermoë/*Increasing reducing ability*

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

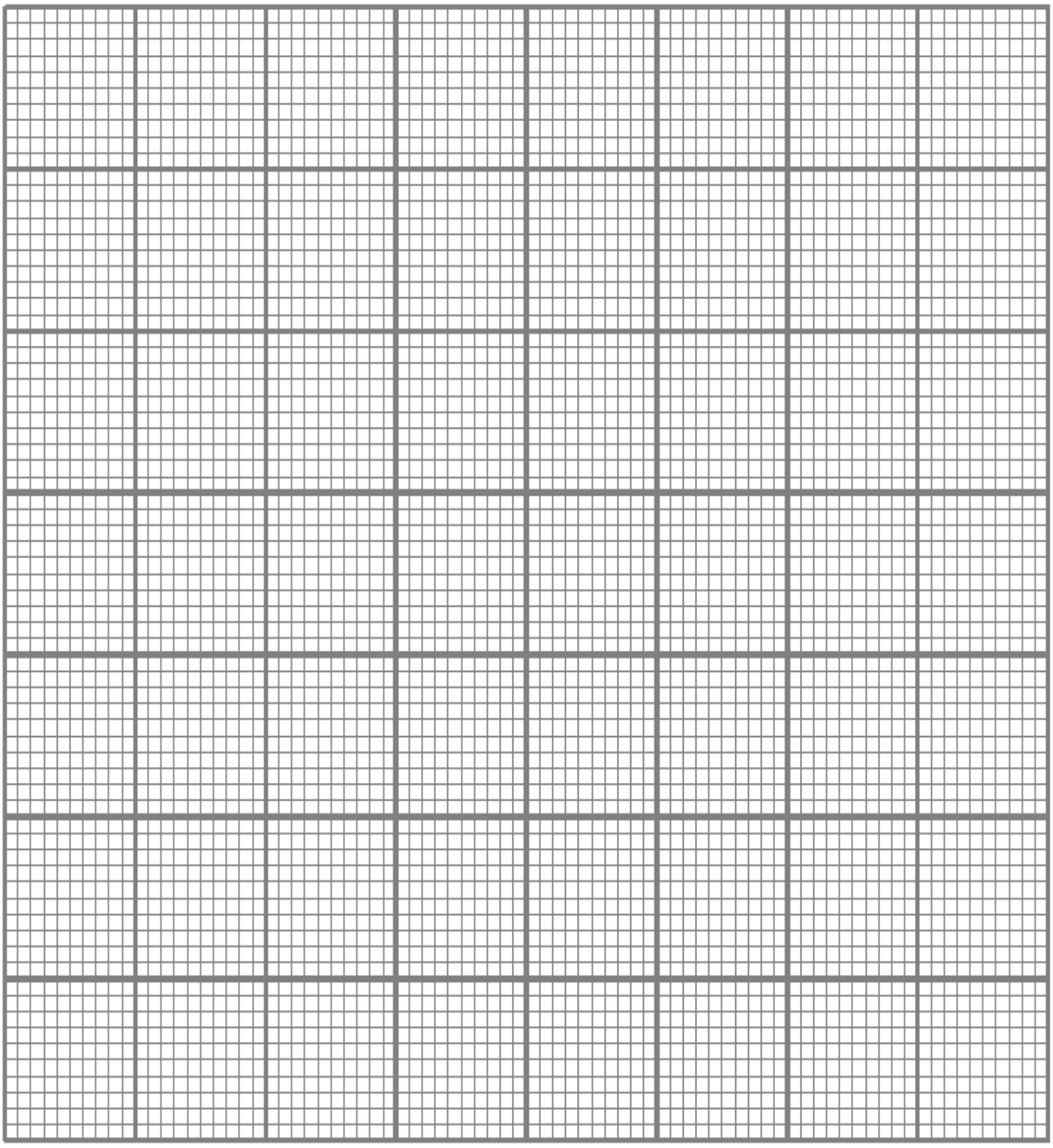
Toenemende oksiderende vermoë/*Increasing oxidising ability* ↓

Toenemende reduserende vermoë/*Increasing reducing ability* ↑

Halfreaksies/*Half-reactions*			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

NAME: **GRADE:**

QUESTION 4.1.5



PHYSICAL SCIENCES – PAPER 2
FISIESE WETENSKAPPE – VRAESTEL 2

ANSWER SHEET / ANTWOORDBLAD

NAME / NAAM: ……..

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: MEERVOUDIGE-KEUSEVRAE

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