education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

PHYSICAL SCIENCES: CHEMISTRY (P2)

PREPARATORY EXAMINATION 2008

MARKS: 150

TIME: 3 hours

This question paper consists of 13 pages, a 4-page data sheet and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

1. Write your name in the appropriate spaces on the ANSWER BOOK AND ANSWER SHEET.
2. Answer ALL the questions.
3. Answer SECTION A on the attached ANSWER SHEET.
4. Answer SECTION B in the ANSWER BOOK.
5. Non-programmable calculators may be used.
6. Appropriate mathematical instruments may be used.
7. Number the 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. Give brief motivations, discussions, et cetera where required.

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 attached ANSWER SHEET.

1.1 Elimination of H_2O from an alcohol (1)

1.2 Hydrocarbons containing triple bonds (1)

1.3 Alkanes in which a hydrogen atom has been substituted by a halogen atom (1)

1.4 The gas released at the anode during the electrolysis of a sodium chloride solution (1)

1.5 The electrode in an electrochemical cell where reduction takes place (1)
[5]

QUESTION 2: MATCHING ITEMS

Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A – J) next to the question number (2.1 – 2.5) on the attached ANSWER SHEET.

	COLUMN A		COLUMN B
2.1	A group of compounds that can undergo addition reactions	A	sodium ion concentration
2.2	The functional group of the ketones	B	standard cell
2.3	A factor that can increase the rate of reaction	C	hydrogen half-cell
2.4	The reference electrode	D	alkanes
2.5	A consequence of eutrophication	E	$-\overset{\overset{\displaystyle O}{\|}}{C}-$
		F	lack of oxygen
		G	$-\overset{\overset{\displaystyle O}{\|}}{C}-H$
		H	high pressure
		I	alkenes
		J	low temperature

[5]

QUESTION 3: TRUE/FALSE ITEMS

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write 'true' or 'false' next to the question number (3.1 – 3.5) on the attached ANSWER SHEET. Correct the statement if it is FALSE.

3.1 Ethanol, ethanoic acid and ethane are members of the same homologous series. (2)

3.2 The benzene ring consists of six carbon atoms. (2)

3.3 A standard cell that has a negative emf cannot be used as a galvanic cell. (2)

3.4 Increasing the temperature of an exothermic reaction that has reached equilibrium, will increase the Kc value. (2)

3.5 The primary nutrients for plants are C, P and K. (2)

[10]

QUESTION 4: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and make a cross (X) in the block (A – D) next to the question number (4.1 – 4.5) on the attached ANSWER SHEET.

4.1 When the group $-\overset{\overset{\displaystyle O}{||}}{C}-O-$ is present in a compound, the compound may be ...

A propanal.

B 1-propanol.

C propanone.

D methyl ethanoate. (3)

4.2 Which ONE of the following compounds is saturated?

A C_4H_{10}

B C_5H_{10}

C C_5H_9OH

D C_6H_{10} (3)

4.3 When the enthalpy of a chemical reaction increases, ...

A ΔH is negative.

B the reaction is endothermic.

C the temperature in the reaction vessel will increase.

D the reaction cannot take place spontaneously. (3)

4.4 One of the stages in the industrial preparation of iron from its ore is represented by the equation below:

$$Fe_2O_3(s) + 3CO(g) \rightleftharpoons 2Fe(\ell) + 3CO_2(g)$$

The following changes are made to the system:

(i) Fe_2O_3 is added
(ii) CO_2 is removed
(iii) CO is removed

Which of the changes mentioned above will favour the forward reaction?

A (i), (ii) and (iii)

B (i) and (ii) only

C (ii) only

D (iii) only (3)

4.5 A commercial dry cell used in a torch is an example of a/an ... cell.

A primary

B secondary

C electrolytic

D hydrogen (3)
[15]

TOTAL SECTION A: 35

SECTION B

INSTRUCTIONS AND INFORMATION

1. Answer this section in the ANSWER BOOK.
2. The formulae and substitutions must be shown in ALL calculations.
3. Round off your answers to TWO decimal places.

QUESTION 5

5.1 Write down the structural formulae and IUPAC names for the product(s) formed when the following compounds react with each other:

5.1.1 cyclohexene and $HC\ell$ (3)

5.1.2 $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{C}}=CH-CH_3$ and HBr (3)

5.2 The following equations represent chemical reactions:

Reaction 1: **A** + HBr $\rightarrow$ $CH_3\text{-}CH_2\text{-}CH_2Br + H_2O$

Reaction 2: $CH_3\text{-}CH_2\text{-}CH_2Br \xrightarrow{NaOH}$ **A** + NaBr

5.2.1 Name the type of reaction in reaction 2. (1)

5.2.2 Write down the structural formula for the organic compound A. (2)

5.3 Cracking is a process that is generally used in the oil industry.

5.3.1 What is meant by *cracking*? (2)

5.3.2 Why is cracking used in the fuel industry? (2)

5.3.3 Give a reason for the difference in the melting and boiling points of the following two compounds, produced from a specific cracking process:

COMPOUND	MELTING POINT (°C)	BOILING POINT (°C)
Butane	-138	-1
Heptane	-91	89

(2)

5.3.4 In which phase (gas, liquid or solid) is each of the following when used as a fuel:

(a) Butane

(b) Heptane (2)

[17]

QUESTION 6

Jana wants to investigate how molecular mass influences the boiling points of the first eight straight chain alcohols.

6.1 Which property of the alcohols could make this investigation dangerous? (1)

6.2 Structural isomers can influence the outcome of this investigation. Alcohols with more than two carbon atoms have more than one structural isomer.

6.2.1 Write down the structural formulae and IUPAC names of the structural isomers of the alcohol containing three carbon atoms. (6)

6.2.2 Jana uses heptan-1-ol as one of the compounds in the investigation. Which ONE of the isomers named in QUESTION 6.2.1 must she use for this to be a fair test? (1)

6.2.3 Explain the need for this choice in QUESTION 6.2.2. (2)

6.3 Design an investigation that Jana can conduct. Use the following headings in your design:

6.3.1 Hypothesis (2)

6.3.2 Precautions (1)

6.3.3 Apparatus (4)

6.3.4 Method (3)
[20]

QUESTION 7

Kano tries to light a fire next to the road on a cold winter morning while waiting for the school bus. He finds that the fire burns better when he blows on it.

7.1 Explain, using the collision theory, why the fire burns better when he blows on it. (2)

7.2 Give ONE other method that Kano can use to make his fire burn faster, and explain why this method will have the desired effect. (2)

7.3 Briefly explain why the reason mentioned in QUESTION 7.1 makes it very dangerous for Kano to leave the fire when the bus arrives without putting it out thoroughly. (2)

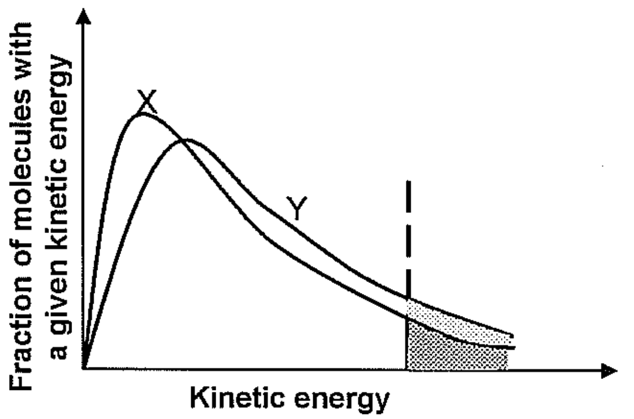
7.4 Kano uses a match to light the fire. What is the energy that is supplied by the match called? (1)
[7]

QUESTION 8

A learner investigates a way to increase the rate at which hydrogen gas develops in the reaction between zinc and hydrochloric acid.

8.1 By changing one reaction condition she obtains the graph below, in which:

- Curve X denotes the initial condition
- Curve Y denotes the changed condition that produced a higher reaction rate

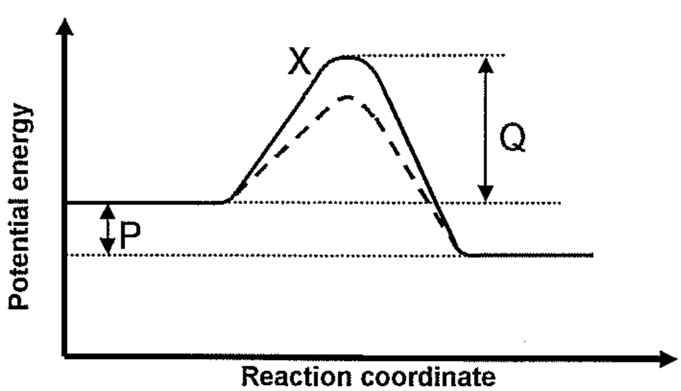


8.1.1 Which reaction condition did the learner change? (2)

8.1.2 Apply the collision theory and explain why the changed condition results in a higher reaction rate. (3)

8.2 She then changes another condition in which the effect is represented by the graph below. Once again:

- Curve X denotes the initial condition
- Curve Y denotes the changed condition that resulted in a higher reaction rate



8.2.1 Which reaction condition did the learner change? (2)

8.2.2 What is the name of the energy value denoted by the following:

(a) P (1)

(b) Q (1)
[9]

QUESTION 9

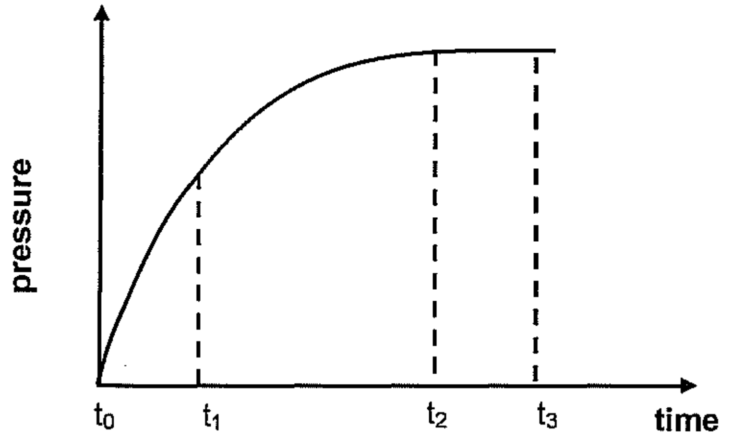
William wants to determine the equilibrium constant for the decomposition of calcium carbonate ($CaCO_3$).

He seals 2,0 g of $CaCO_3$ in an evacuated 1,0 dm^3 metal flask and connects a pressure gauge to the flask.

The flask is placed in an oven and heated to a temperature of 800 °C at which equilibrium was reached according to the following equation:

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g) \qquad \Delta H > 0$$

The graph obtained for pressure versus time for the decomposition of calcium carbonate is shown below.



9.1 How does the rate of the reverse reaction change from t_0 to t_1? (2)

9.2 What is the reason for the horizontal line between t_2 and t_3? (1)

9.3 Draw a sketch graph to show how the mass of $CaCO_3$ changes for the period t_0 to t_3. (4)

9.4 During a power failure the temperature of the oven drops to 500 °C. What effect (only write down INCREASES, DECREASES or STAYS THE SAME) does this decrease in temperature have on the following:

9.4.1 The rate of the forward reaction (1)

9.4.2 The concentration of CO_2 (1)

9.4.3 The value of K_c (1)

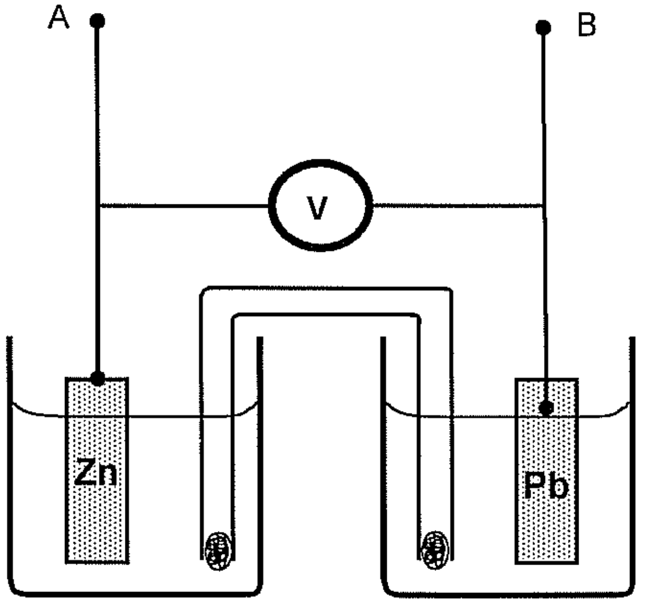
9.5 Give a reason for your answer to QUESTION 9.4.3. (4)

9.6 When equilibrium was established at 800 °C, the concentration of CO_2 present in the flask was $1,4 \times 10^{-2}$ $mol \cdot dm^{-3}$.

Calculate the equilibrium constant (K_c) at 800 °C for this reaction. (2)
[16]

QUESTION 10

Tina wants to investigate the effect of the area of the metal plates used as electrodes in a galvanic cell on the emf of the cell. She sets up the following Zn/Pb cell under standard conditions and measures the emf.



10.1 Which electrode will show an increase in mass when this cell is functioning? (1)

10.2 Write down the equation for the half-reaction occurring at the anode. (2)

10.3 Calculate the emf that you would expect Tina to read on the voltmeter. (4)

10.4 Name TWO variables that should be controlled during this investigation. (2)

10.5 Tina now replaces the two metal plates with ones of larger surface area, and takes the reading again.

10.5.1 How would you expect the new emf to compare with the one calculated in QUESTION 10.3? (Only write SMALLER THAN, LARGER THAN or EQUAL TO.) (1)

10.5.2 Explain your answer to QUESTION 10.5.1. (2)

10.6 Tina now connects a resistor of low resistance across terminals A and B. She notes that the reading on the voltmeter immediately drops.

10.6.1 Give a reason for this observation. (2)

10.6.2 After some time she observes a further gradual drop in the reading on the voltmeter. Give a reason for this observation. (2)

[16]

QUESTION 11

11.1 In an aluminium smelter, aluminium metal is *extracted* from bauxite, a hydrated aluminium oxide, via an electrolytic process.

11.1.1 Write down the energy conversion that takes place in an electrolytic cell. (2)

11.1.2 Write down the equation for the half-reaction responsible for the formation of aluminium metal in a smelter. (2)

11.1.3 Explain in terms of the relative strength of oxidising agents why the electrolytic production of aluminium requires more electrical energy than that of iron or copper. (2)

11.1.4 Name TWO advantages that the use of aluminium has over that of iron. (2)

11.2

> A huge aluminium smelter is planned in Coega in the Eastern Cape. When operational, it will consume 1 350 MW of electricity, or 4% of the nation's total energy.
>
> It is estimated that 5 200 jobs will be created at the peak of construction. About 1 000 workers will be employed on a full-time, permanent basis, and between 200 and 300 full-time subcontractors will also be directly associated with the smelter.
>
> [Source: *Engineering News* (http://www.engineeringnews.co.za) and *Groundwork* (www.groundwork.org.za)]

11.2.1 Taking the present South African socio-economic realities into account, give ONE reason why the aluminium smelter should:

(a) Not be built (1)

(b) Be built (1)

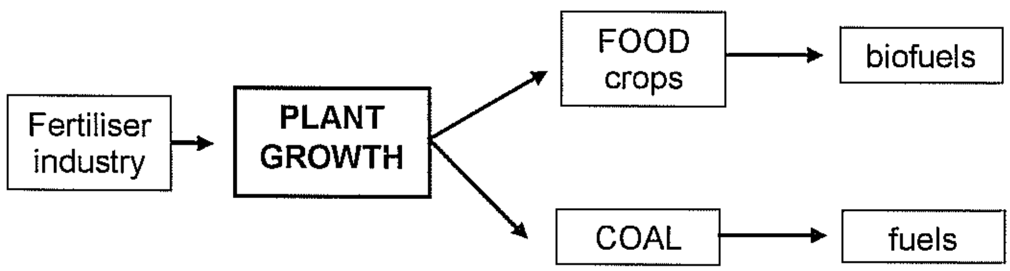
11.2.2 Give ONE reason why environmental activists oppose the construction of the smelter. (1)

[11]

QUESTION 12

Read the passage below and answer the questions that follow.

The fertiliser industry is central to plant growth and the production of fuels as illustrated below:



Plants are an important natural resource. In addition to their many other benefits, they produce:

Food by photosynthesis and
Coal through plant decay and compaction over millions of years.

Coal is a non-renewable resource and is used by industry, for example SASOL to produce fuels.

Global concerns around the production of fuels include the following:

- The growing shortages of both fuel and food
- The depletion of non-renewable resources
- Population growth and increasing demands on natural resources
- Global warming, climate change and environmental degradation

A growing demand for fuel, together with its anticipated shortage, is intensifying the search for alternate methods of fuel production. Some organisations favour the production of biofuels from food crops claiming that it will help fight against climate change and environmental degradation. Others argue against it claiming that unintended consequences can have adverse effects on the world's starving population.

12.1 What argument is used for the following:

12.1.1 In support of the production of biofuels (1)

12.1.2 Against the production of biofuels (1)

12.2 What is a *non-renewable resource*? (1)

12.3 Name TWO risks of using coal or oil for fuel production. (2)

12.4 Name TWO reasons why the increase in fuel price results in an increase in food prices. (2)

12.5 Why would the excessive use of fertilisers be problematic? Explain. (3)

12.6 The Haber process is used in the production of fertilisers.

12.6.1 The Haber process supplies one primary nutrient for plants. Name this nutrient. (1)

12.6.2 What function does this primary nutrient serve in plants? (1)

12.6.3 Name TWO ways in which the Haber process is dependent on fuel. (2)

12.6.4 Write a balanced chemical equation for the chemical change that occurs in the Haber process. (3)

12.6.5 Name ONE disadvantage of the use of inorganic fertilisers prepared through the Haber process. (2)
[19]

TOTAL SECTION B: 115

GRAND 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}	$1{,}013 \times 10^{5}$ 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*

$n = \frac{m}{M}$	$c = \frac{n}{V}$
$c = \frac{m}{MV}$	$E^{\theta}_{cell} = E^{\theta}_{cathode} - E^{\theta}_{anode}$ / $E^{\theta}_{sel} = E^{\theta}_{katode} - E^{\theta}_{anode}$ $E^{\theta}_{cell} = E^{\theta}_{reduction} - E^{\theta}_{oxidation}$ / $E^{\theta}_{sel} = E^{\theta}_{reduksie} - E^{\theta}_{oksidasie}$ $E^{\theta}_{cell} = E^{\theta}_{oxidising\ agent} - E^{\theta}_{reducing\ agent}$ / $E^{\theta}_{sel} = E^{\theta}_{oksideermiddel} - E^{\theta}_{reduseermiddel}$

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

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)
(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

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

Increasing oxidising ability/*Toenemende oksiderende vermoë* (↑)

Increasing reducing ability/*Toenemende reduserende vermoë* (↓)

Half-reactions/*Halfreaksies*			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
$2H^+ + 2e^-$	⇌	**$H_2(g)$**	**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

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

NAME: ______________________

PHYSICAL SCIENCES P2 GRADE 12 ANSWER SHEET

VRAAG 1

1.1 ______________________ (1)

1.2 ______________________ (1)

1.3 ______________________ (1)

1.4 ______________________ (1)

1.5 ______________________ (1)

[5]

VRAAG 2

2.1 ______________________ (1)

2.2 ______________________ (1)

2.3 ______________________ (1)

2.4 ______________________ (1)

2.5 ______________________ (1)

[5]

VRAAG 3

3.1 ____

____ (2)

3.2 ____

____ (2)

3.3 ____

____ (2)

3.4 ____

____ (2)

3.5 ____

____ (2)

[10]

VRAAG 4

4.1	A	B	C	D
4.2	A	B	C	D
4.3	A	B	C	D
4.4	A	B	C	D
4.5	A	B	C	D

(5 x 3) [15]

TOTAL SECTION A: 35