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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2022

GRADE 10

PHYSICAL SCIENCES (CHEMISTRY)

(PAPER 2)

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TIME: 1 hour

MARKS: 50

8 pages + 2 data sheets and a graph sheet

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INSTRUCTIONS AND INFORMATION

1. Write your name in the appropriate space on the ANSWER BOOK.
2. This question paper consists of SIX questions. Answer ALL the questions.
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. Write neatly and legibly.
6. You may use a non-programmable calculator.
7. You may use appropriate mathematical instruments.
8. Use the DATA SHEETS that are attached.
9. Show ALL formulae and substitutions in ALL calculations.
10. Round off your final numerical answers to a minimum of TWO decimal places, where needed.

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QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter (A – D) next to the question number (1.1 to 1.5) in the ANSWER BOOK.

1.1 Which of the following is a homogeneous mixture?

A Sand and water
B Muesli
C Salt solution
D Carbon dioxide (2)

1.2 The process whereby a substance changes from a liquid to a solid at low temperature is called …

A evaporation
B freezing
C melting
D sublimation (2)

1.3 The correct formula for lead(II) nitrate is …

A $Pb_2(NO_3)_3$
B $Pb(NO_3)_2$
C $Pb_3(NO_3)_2$
D $PbNO_3$ (2)

1.4 The electronegativity of sulphur is …

A 32
B 16
C VI
D 2,5 (2)

1.5 Two substances that can be classified as molecular substances are:

A Ammonia and hydrogen chloride
B Magnesium chloride and hydrogen chloride
C Magnesium chloride and sodium
D Graphite and iodine (2)

[10]

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QUESTION 2 (Start on a new page.)

2.1 Differentiate between a *thermal conductor* and an *electrical conductor*. (2)

2.2 Study the seven substances listed below and answer the questions that follow.

glass; copper; sugar water; nickel; carbonated water; air; carbon dioxide

From the list above, identify:

2.2.1 A thermal conductor (1)

2.2.2 A magnetic material (1)

2.2.3 A heterogeneous mixture (1)

2.2.4 An electrical insulator (1)
[6]

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QUESTION 3 (Start on a new page.)

The grade 10 learners were investigating the effect of heat on ice, $H_2O_{(s)}$. The temperature was recorded every 5 minutes. The following results were obtained and recorded in the table below.

Time (min)	0	5	10	15	20	25	30	35	40
Temperature (°C)	-10	0	0	0	25	45	75	85	85

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

3.2 Name the instrument used to measure the temperature of ice, $H_2O_{(s)}$. (1)

3.3 Identify the independent variable. (1)

3.4 On the graph sheet provided, draw the graph that represents the data provided in the table above. (5)

3.5 Name the process that water undergoes at the time between 35 and 40 minutes. (1)

3.6 Explain your answer to QUESTION 3.5 by referring to energy changes. (3)

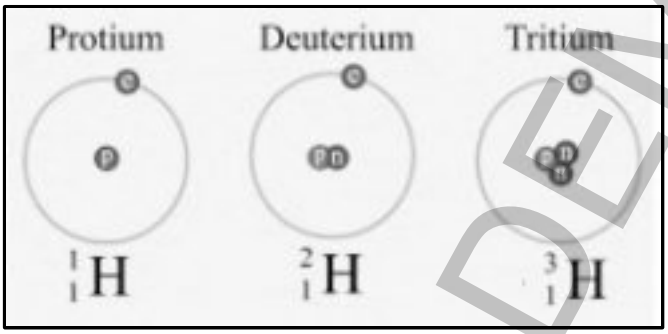
[13]

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QUESTION 4 (Start on a new page.)

The diagram below shows the element hydrogen which has three isotopes: protium, deuterium and tritium.



4.1 Define the term *isotopes*. (2)

4.2 The table below shows the three isotopes, the number of particles (incomplete) and the relative abundance of each isotope.

Isotopes of hydrogen	Number of protons	Number of electrons	Number of neutrons	Mass number	Relative abundance (%)
Protium	1	(4.2.1)	(4.2.2)	1	99,985
Deuterium	1	1	1	(4.2.3)	0,015
Tritium	(4.2.4)	1	2	3	Rare (negligible)

Complete the table by writing only 4.2.1 to 4.2.4 and the correct number of particles. (4)

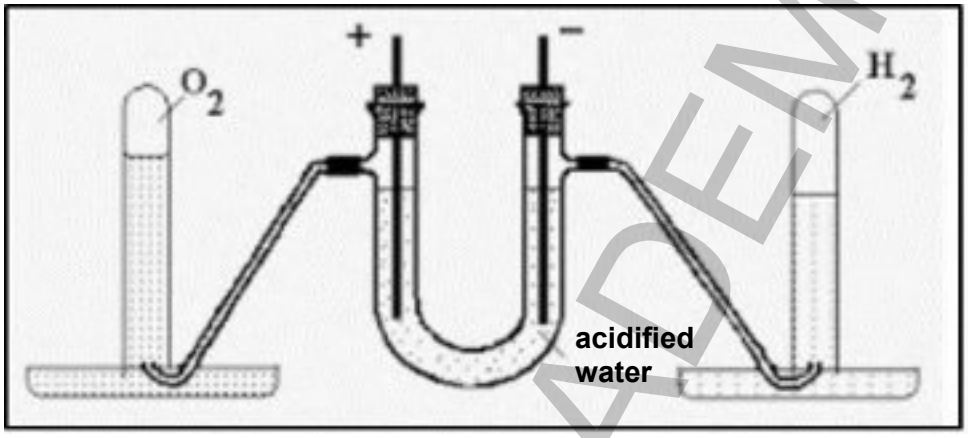
4.3 Use the table above and calculate the relative atomic mass of hydrogen. (3)
[9]

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QUESTION 5 (Start on a new page.)

Electrolysis is the process of using electricity to decompose water into oxygen and hydrogen gas. The experimental setup is shown in the diagram below.



The equation for this experiment is:

$$2H_2O \rightarrow 2H_2 + O_2$$

5.1 Identify the bond in water. Choose from covalent bond, ionic bond or metal bond. Explain the answer. (2)

5.2 Draw the Aufbau diagram of an oxygen atom. (2)

5.3 Write the sp-notation of oxide ion. (2)

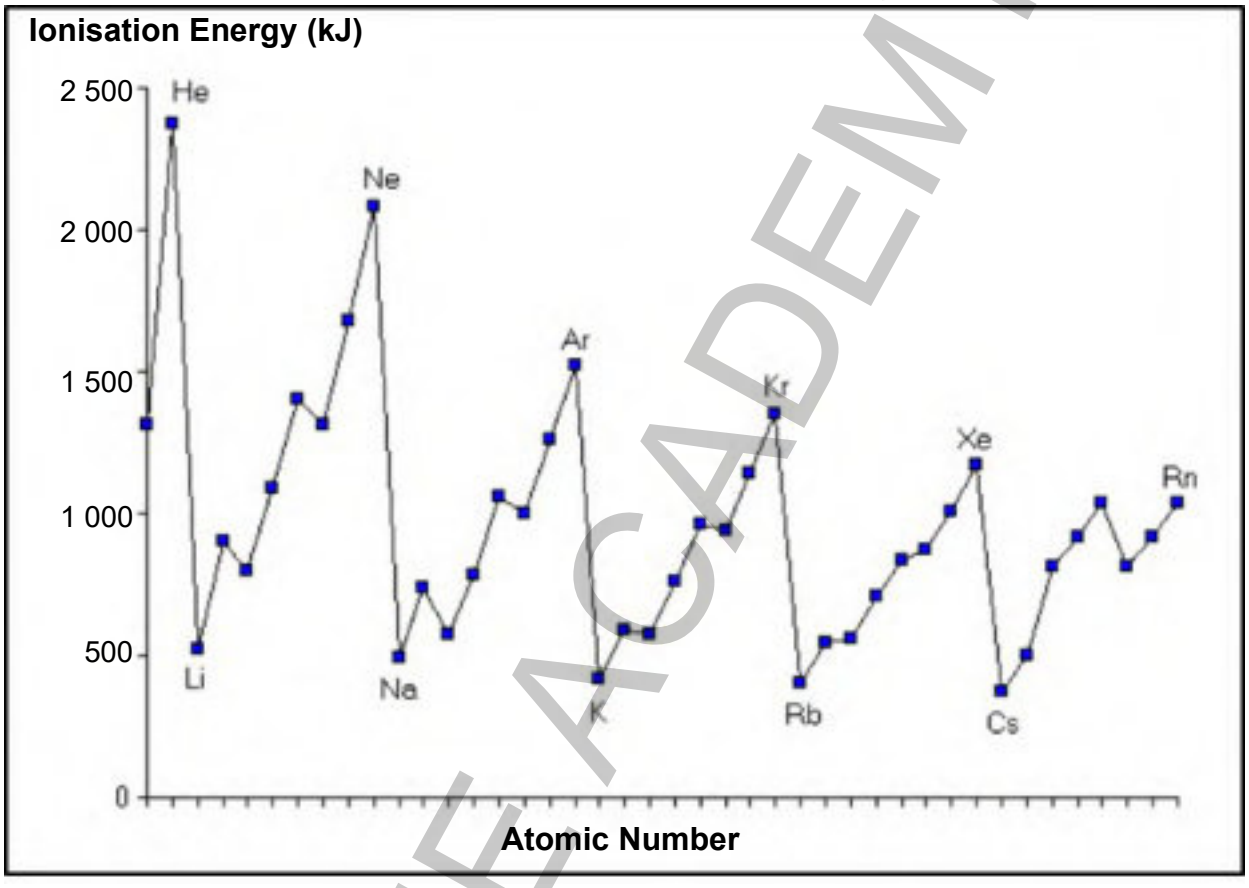
5.4 Draw the Lewis dot diagram for an oxygen molecule. (2)
[8]

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QUESTION 6 (Start on a new page.)

The following graph shows the first ionisation energy for a few elements.



6.1 Define the term *ionisation energy*. (2)

6.2 Compare the ionisation energy of elements in group 18, periods 1 and 2, with one another. (2)
[4]

TOTAL: 50

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DATA FOR PHYSICAL SCIENCES GRADE 10
PAPER 2 (CHEMISTRY)

GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 10
VRAESTEL 2 (CHEMIE)

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

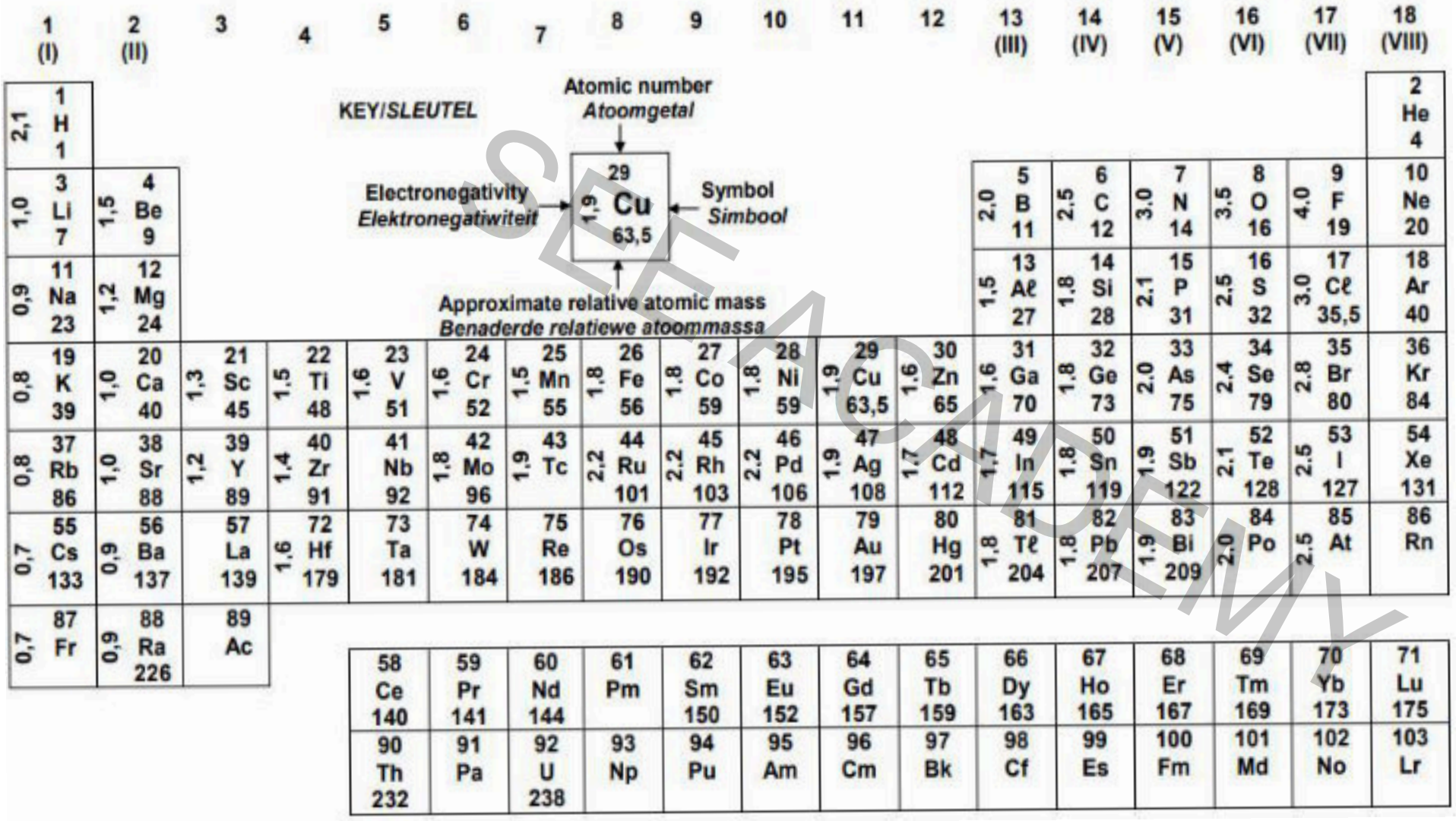
NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Standard pressure *Standaarddruk*	p^{θ}	$1{,}013 \times 10^5$ Pa
Molar gas volume at STP *Molêre gasvolume by STD*	V_m	22,4 $dm^3 \cdot mol^{-1}$
Standard temperature *Standaardtemperatuur*	T^{θ}	273 K
Charge on electron *Lading op elektron*	e	$-1{,}6 \times 10^{-19}$ C
Avogadro's constant *Avogadro se konstante*	N_A	$6{,}02 \times 10^{23}$ mol^{-1}

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

$n = \frac{m}{M}$	$n = \frac{N}{N_A}$
$c = \frac{n}{V}$ OR $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$

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



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