higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PHYSICAL SCIENCE
(Second Paper)
NQF LEVEL 2

(10021002)

29 November 2019 (Y-Paper)
13:00–16:00

A non-programmable calculator and drawing instruments may be used.

This question paper consists of 8 pages and 1 periodic table.

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TIME: 3 HOURS
MARKS: 150

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Round off ALL answers to TWO decimals.
5. Show formulae and substitutions in ALL calculations.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

Give ONE term for each of the following descriptions. Write only the word or term next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 Group of elements having properties of metals and non-metals, some of which are useful in semiconductors and electronic components

1.2 Cycle that involves the continuous movement of water on, above and below the surface of the earth.

1.3 Sphere that helps to regulate temperature on earth

1.4 Process in which a substance dissolves in water

1.5 Forces that are broken down during physical changes

(5 × 1) **[5]**

QUESTION 2

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (2.1–2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	Property that determines how easily a liquid flows	A	Group II
2.2	Group of elements known as alkali metals	B	condensation
2.3	Cooling of gases until they liquify	C	viscosity
2.4	Method used to remove undissolved solids from a liquid or gas	D	Group I
2.5	Material that dissolves in water to give a pH of less than 7	E	filtration
		F	acid
		G	elements
		H	melting

(5 × 1) **[5]**

QUESTION 3

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (3.1–3.5) in the ANSWER BOOK.

3.1 Magnesium bicarbonate causes permanent hardness in water.

3.2 Relative density refers to the density of a substance compared to the density of water.

3.3 Neon is the noble gas with a valence number of 1.

3.4 Molecules are two atoms linked together.

3.5 Convection is the way of transferring heat by circulating it.

(5 × 2) **[10]**

QUESTION 4

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (4.1–4.5) in the ANSWER BOOK.

4.1 How many electrons can a p-orbital accommodate?

A 0
B 2
C 6
D 8

4.2 A type of mixture of oil, egg yolk and vinegar that makes mayonnaise:

A homogeneous mixture
B alloy
C heterogeneous mixture and emulsion
D heterogeneous mixture and suspension

4.3 Carbon dioxide reacts with water and forms …

A carbon.
B carbonic acid.
C carbon monoxide.
D carbon dioxide.

4.4 Earth is called …

A the green planet because of it being the purest and green.
B the blue planet because of the deserts and other areas.
C the blue planet because of the oceans.
D the white planet because of the snow at the poles and high mountains.

4.5 Which property of matter is the only way to positively classify a compound as ionic, polar or non-polar?

A Colour
B State of matter
C Solubility of water
D Electric conductivity of the liquid of a substance

(5 × 3) **[15]**

TOTAL SECTION A: 35

SECTION B

QUESTION 5: MATTER AND MATERIALS

The table below shows the melting and boiling points for the substances A to D at room temperature (25 °C).

Substance	Melting point (°C)	Boiling point (°C)
A	-218	-183
B	0	100
C	51	320
D	-20	40

5.1 Refer to the table above and write down the phase/state of each substance at each of the following:

5.1.1 A

5.1.2 B

5.1.3 C

5.1.4 D

(4 × 1) (4)

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

5.3 Explain the strength of the forces between the molecules of A and that of B? (4)
[10]

QUESTION 6

6.1 Draw the structure of an atom. Clearly show the protons, neutrons and electrons. (6)

6.2 Consider the element $^{9}_{4}Be$.

6.2.1 Is beryllium an element or a compound? (1)

6.2.2 Justify your answer in QUESTION 6.2.1. (3)

6.2.3 Give the name of the group in the periodic table to which beryllium belongs. (1)

6.2.4 Name TWO physical properties of the elements found in this group. (2)

6.3 Write down the s-p notations to show the electron distribution of an:

6.3.1 Aluminium atom

6.3.2 Nitrogen atom

(2 × 2) (4)

6.4 Give an example to describe the covalent bonding between TWO atoms. (4)

6.5 Write down the chemical name of each of the following compounds:

6.5.1 Washing soda

6.5.2 Table salt

(2 × 2) (4)
[25]

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QUESTION 7

7.1 Temperature is measured in the SI units Kelvin (K) and degree Celcius (°C).

7.1.1 Name the instrument used to measure temperature. (1)

7.1.2 Which temperature scale designates the freezing point as 100 °C. (1)

7.1.3 Define *absolute temperature*. (2)

7.1.4 Convert 263 K to °C. (2)

7.2 A bath contains 50 kg of water at 4 °C. The temperature of the water must be 35 °C.

How much water at 95 °C must be added, with a specifc heat capacity of 4187 J/kg.^{0}C, to accomplish this? Accept that there is no loss of heat. (4)

7.3 Use a reaction to differentiate between a *physical* and a *chemical* change. (4)

7.4 State whether each change will be physical or chemical:

7.4.1 Boiling water

7.4.2 Food decaying

7.4.3 Mashing potatoes

7.4.4 Tearing a piece of paper

(4 × 1) (4)

7.5 A copper sulphate solution is added to a solution of calcium cloride.

Explain whether or not a precipitate is formed. Prove your answer with a balanced equation. (6)

[24]

QUESTION 8

8.1 Define *solution* and give ONE example. (4)

8.2 Calculate the formula mass of each of the following:

8.2.1 $Fe(NO_3)_2$

8.2.2 CH_3COONa

(2 × 3) (6)

8.3 Calculate the number of grams in 2,5 moles of Na_2CO_3. (4)

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8.4 Calculate the concentration of each of the following:

8.4.1 50 g of magnesium chloride in 250 mℓ of solution

8.4.2 25,5 g of acetic acid in 5 dm^3 of solution

(2 × 3) (6)

8.5 Corrosion occurs when something is destroyed progressively by a chemical action.

8.5.1 Write the balanced chemical equation when iron reacts with air to form rust. (4)

8.5.2 Name TWO methods used to prevent iron from rusting. (2 × 2) (4)

[28]

QUESTION 9

9.1 Earth is the only known planet in the universe where life can be supported.

List and briefly describe the FOUR global systems that Earth is composed of. (4 × 2) (8)

9.2 Water hardness can be divided into two groups.

Name TWO types of water hardness and identify their chemical causes. (2 × 2) (4)

[12]

QUESTION 10

10.1 In South Africa, fresh water is our most limited resource.

10.1.1 List FIVE places on Earth where water is found. (5)

10.1.2 What is the biggest limitation to the development of South Africa? (2)

10.2 Write the equation to represent the formation of acid rain. (4)

10.3 Dams are very important for water storage in order to meet the needs of local communities.

List FIVE negative effects that the building of dams has on people and the environment. (5)

[16]

TOTAL SECTION B: 115
GRAND TOTAL: 150

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(100210O2)

THE PERIODIC TABLE OF ELEMENTS
DIE PERIODIEKE TABEL VAN ELEMENTE

