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 2024 (Y-paper)
13:00–16:00

Non-programmable calculators may be used.

This question paper consists of 9 pages and 1 information sheet.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
PHYSICAL SCIENCE
NQF LEVEL 2
(Second paper)
TIME: 3 HOURS
MARKS: 100

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. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

Complete the following sentences by filling in the missing word or words. Write only the word or words next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 Covalent bond is formed by the … of electrons.

1.2 … is a universal solvent.

1.3 Highly reactive metals displace … reactive metals.

1.4 … is heat given out in waves.

1.5 … is a process of removing salt from seawater

(5 × 1) **[5]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 Metallic bonding occurs when one element replaces another element.

2.2 Solute and solute forms a solution.

2.3 Electrolysis is a solution that allows a transfer of electricity.

2.4 Heat transfer is not affected by mass, temperature and specific heat capacity.

2.5 Hard water has stones in it.

(5 × 2) **[10]**

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QUESTION 3

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–G) next to the question number (3.1–3.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	A mixture in which the composition is uniform throughout the mixture	A	Joule
3.2	A substance that has a partial positive end and partial negative end	B	semi-permeable
3.3	The base unit of temperature in the International System of Units (SI)	C	Kelvin
3.4	A device used to separate two immiscible liquids	D	plastic funnel
3.5	Membrane that allows some substances to pass through	E	homogeneous
		F	separating funnel
		G	polar solvent

(5 × 1) **[5]**

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 Which ONE of the options below is a property of metals?

A They are good Insulation.
B They are used to wrap thermometers.
C They are good conductors of electricity.
D They are used to manufacture all materials.

4.2 The group number in the periodic table is the same as the number of …

A core electrons.
B paired electrons.
C valence electrons.
D unpaired electrons.

4.3 Separation of mud and water

A Diffusion
B Emulsion
C Filtration
D Distillation

4.4 Liquid waste resulting from sewage

A Solvent
B Algae
C Effluent
D Gas

4.5 Conservation of energy

A Heat lost by one object is not lost again.
B Heat gained by one object is the same as heat gained by the other one.
C Heat gained by one object is dissipated to air.
D Heat lost by one object is the same as heat gained by the other object.

(5 × 3) **[15]**

TOTAL SECTION A: 35

SECTION B

QUESTION 5

5.1 Complete the TABLE by writing only the answer next to the question number, and elaborate on the behaviour of solids, liquids and gas particles in terms of:

Phase	Nature of particles	Movement pattern	Strength of forces
Solid	5.1.1	5.1.2	5.1.3
Liquid	5.1.4	5.1.5	5.1.6
Gas	5.1.7	5.1.8	5.1.9

(9 × 1) (9)

5.2 Elements are identified using symbols. Classify the following elements into metals, non-metals and semi-metals.

5.2.1 Ge

5.2.2 S

5.2.3 Na

(3 × 2) (6)

5.3 Write the chemical formula of each of the following compounds:

5.3.1 Potassium oxide

5.3.2 Sodium chloride

5.3.3 Aluminium iodide

(3 × 2) (6)

5.4 Define *heterogeneous* and *homogeneous mixture*. (2 × 2) (4)

[25]

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QUESTION 6

An atom is extracted from the periodic table in the second colum and third row. Determine the following:

6.1 Name of the element (2)

6.2 Number of protons (2)

6.3 How many neutrons are there? SHOW calculations in detail. (4)

6.4 SHOW by an illustration Aufbau electron configuration. (4)

6.5 How many core and valence electrons are available? (4)

[16]

QUESTION 7

A pot with water with a mass of 250 grams is heated from 25 ^{o}C to 68 ^{o}C. The specific heat capacity of water is 4187 J/kg.^{o}C

7.1 Determine change in temperature in ^{o}C. (2)

7.2 Calculate heat required. (4)

7.3 A solution is further obtained with sugar and heated water as shown in FIGURE 1.

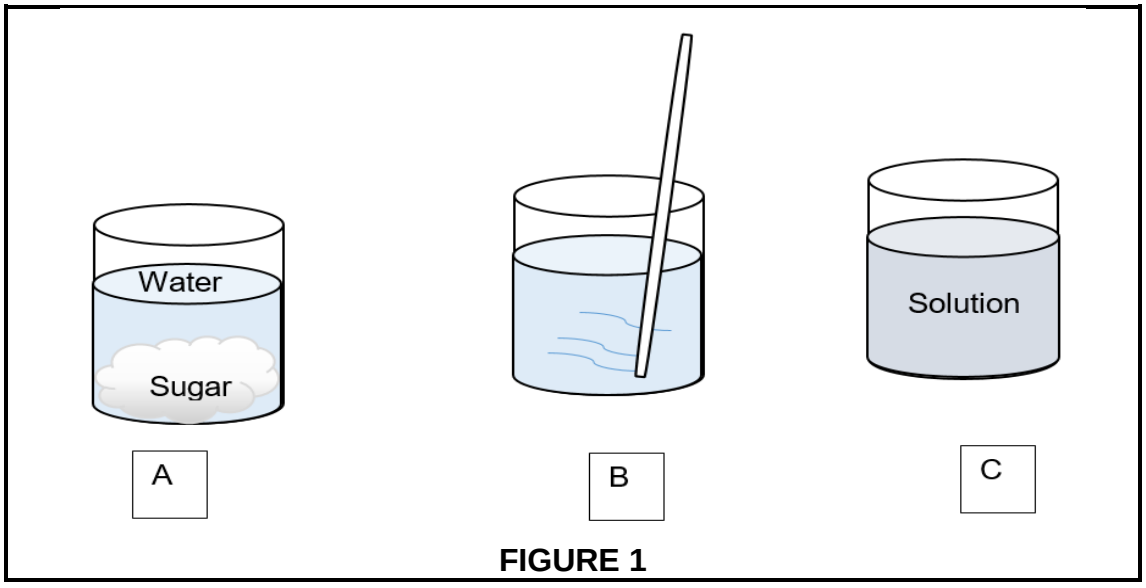


FIGURE 1

7.3.1 Explain how the sugar solution is formed. (2)

7.3.2 Mention TWO physical changes of the sugar solution. (2 × 2) (4)

7.3.3 Explain the method of separation applicable to separate sugar from water. (2)

[14]

QUESTION 8

8.1 When copper (II) chloride salt is dissolved in water, ionic bond between the metal ion and the non-metal ions dissociates into positive and negative ions.

8.1.1 Show by means of the half-reaction how chlorine gas is formed at the anode. (3)

8.1.2 Write a half-reaction for copper formation at the cathode. (3)

8.2 Mass of $Mg(OH)_2$ weighed on a balance is 50 grams.

Calculate the following:

8.2.1 Molecular mass (4)

8.2.2 Number of moles (3)

8.3 An x amount of mass is available for 2 moles of 32 g/mol of a certain substance. What is the mass? (4)

8.4 Given 0,5 dm^3 of a 0,2 g substance with a chemical formula CaS.

Calculate the following:

8.4.1 Molecular mass (4)

8.4.2 Concentration (6)

[27]

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QUESTION 9

Study a simplified water cycle diagram in FIGURE 2 and answer the questions.

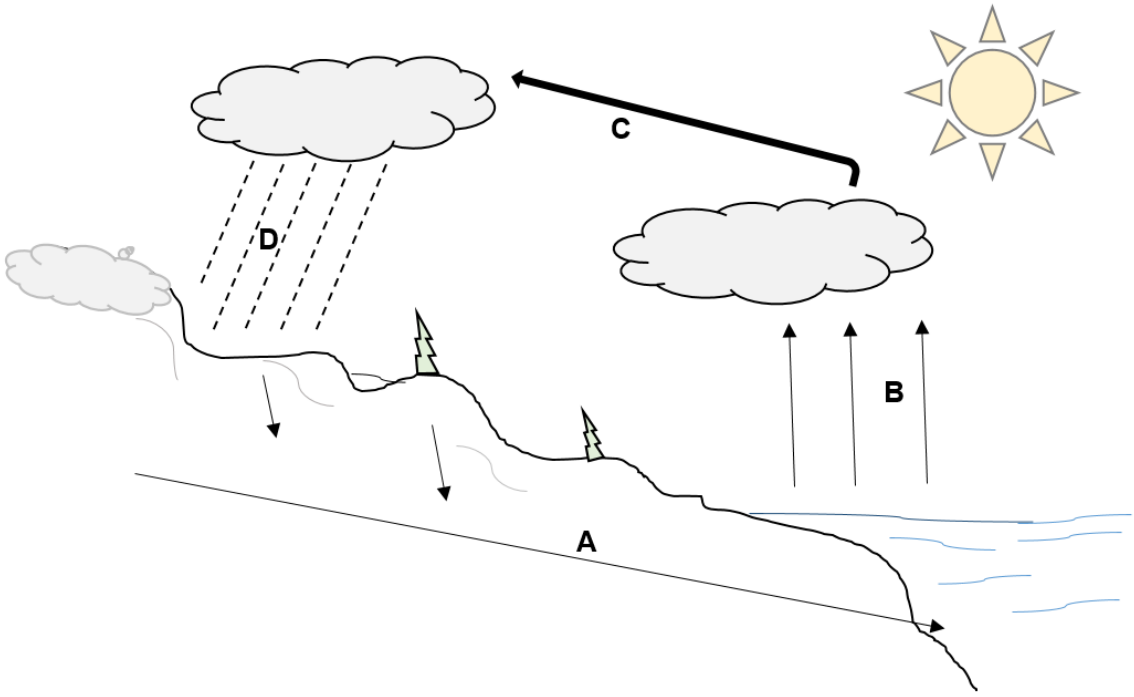


FIGURE 2

9.1 Refer to FIGURE 2 above.

9.1.1 Describe the water cycle stages A-D. (8)

9.1.2 What is the form of energy provided by the sun to the water? (2)

9.2 Explain how water is polluted by:

9.2.1 Industry

9.2.2 Agriculture

9.2.3 Human activities

9.2.4 Air pollution

(4 × 2) (8)

9.3 Water treatment is a vital process prior disposal of effluent to the main river streams.

9.3.1 What is a negative impact of wastewater running into river streams?

9.3.2 Why is necessary to use large sieves in the first stage?

9.3.3 What is the function of the filters in the tertiary stage?

(3 × 2) (6)

9.4 Hard water is water that has high mineral content of Ca $(HCO_3)_2$

9.4.1 State THREE advantages of hard water. (3 × 2) (6)

9.4.2 Write the equation expressing how hardness can be removed in water by boiling. (3)

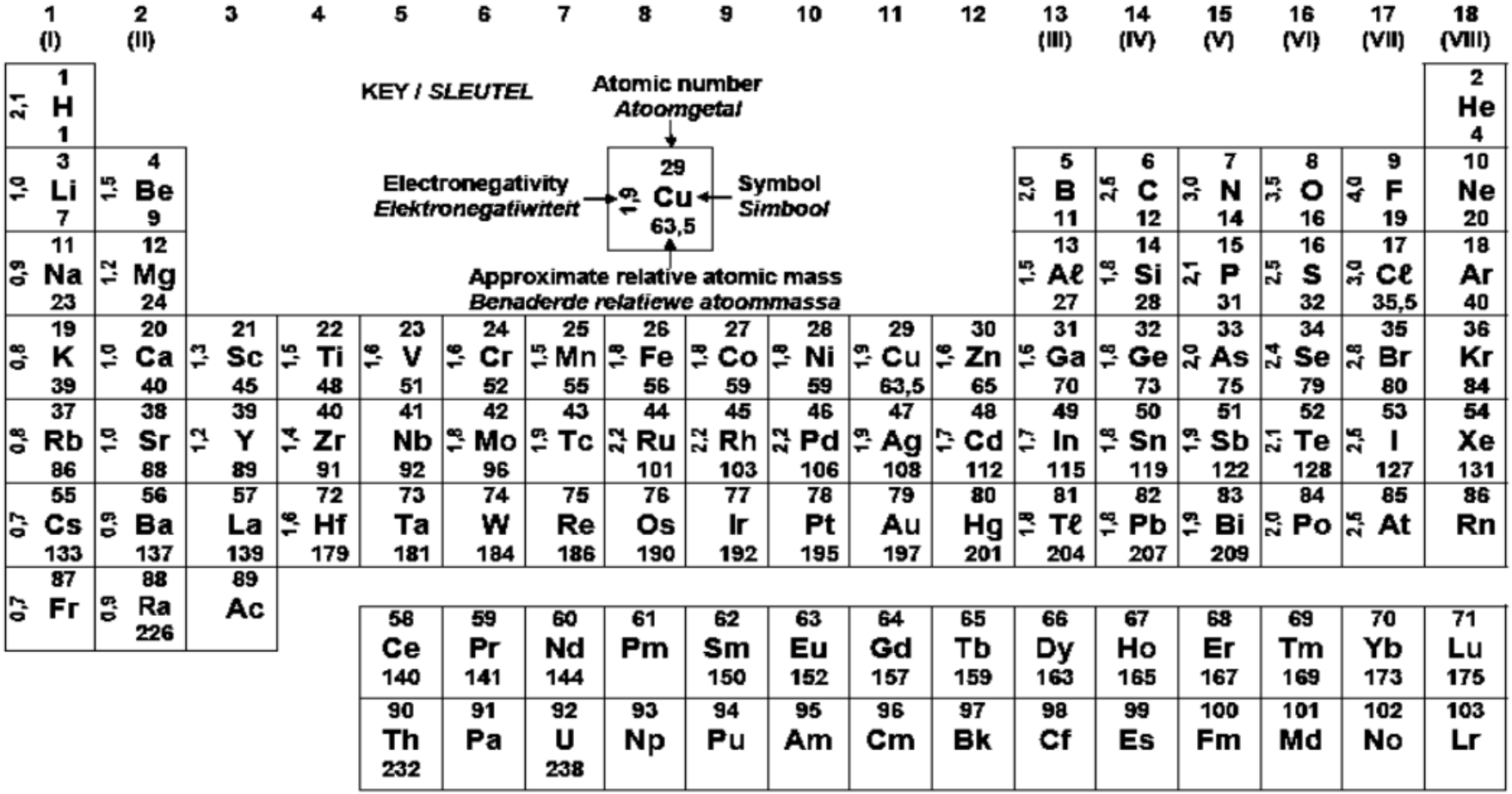
[33]

TOTAL SECTION B: 115
GRAND TOTAL: 150

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(10021002)

THE PERIODIC TABLE OF ELEMENTS
DIE PERIODIEKE TABEL VAN ELEMENTE



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