education

Department of Education
FREE STATE PROVINCE

GRADE 8

NATURAL SCIENCES

MARKS: 50

This question paper consists of 9 pages and a Periodic Table on page 10.

INSTRUCTIONS AND INFORMATION:

1. Answer ALL questions in this question paper.
2. This question paper consists of TWO sections:

   SECTION A: 10 MARKS

   SECTION B: 40 MARKS

3. This question paper consists of SIX questions.
4. Number all your answers according to the numbering system used in the question paper.
5. You may use a non-programmable calculator where necessary.
6. In case of calculations, show all steps.
7. Use a pencil for drawings.
8. Write neatly and legibly.
9. On page 9 of this paper, find the **Periodic Table of Elements**.

SECTION A

QUESTION 1

1.1. Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.5) e.g., 1.1.6 D.

1.1.1 Which one of the following symbols represents the element hydrogen?

A Hg
B He
C Hy
D H (1)

1.1.2 Which one of the following is NOT an example of a compound?

A H_2O
B O_2
C $CuCl_2$
D CO_2 (1)

1.1.3 An element is defined as a substance that …

A contains only two types of atoms.
B is always a solid at room temperature.
C cannot be broken down into simpler substances.
D consists of tiny particles called molecules. (1)

1.1.4 Which process describes the changing of a GAS into a LIQUID by removing heat?

A Melting
B Solidification
B Sublimation
D Condensation (1)

1.1.5 When vinegar is added to baking soda, it causes the rapid formation of carbon dioxide bubbles and leaves behind a cloudy liquid.

What are the products in this chemical reaction?

A Carbon dioxide and the cloudy liquid.
B Vinegar and the cloudy liquid.
C Vinegar and baking soda.
D Carbon dioxide and baking soda. (1)

[5]

1.2 Choose the item in COLUMN B that matches the description in COLUMN A. Write only the letter (A – E) next to the question number (1.2.1 – 1.2.5) in your answer book.

	COLUMN A		COLUMN B
1.2.1	Smallest building block of matter.	A	Periodic Table
1.2.2	A sub-atomic particle that is found in the nucleus of an atom.	B	Electron
1.2.3	The name of the scientific theory that explains that all states of matter consist of particles.	C	Atom
1.2.4	The organised arrangement of all known elements.	D	Proton
1.2.5	A negatively charged sub-atomic particle.	E	Particle model of matter

[5]

TOTAL SECTION A: [10]

SECTION B

QUESTION 2

2.1 Make use of the Periodic Table of Elements that is provided to you at the end of this question paper and answer the following questions.

2.1.1 What are the horizontal rows in the Periodic Table called? (1)

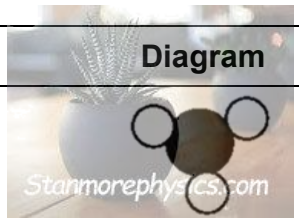
2.1.2 Write down the NAME of the element that is found in group 2, period 3. (1)

2.1.3 How many electrons does an aluminium atom have? (1)

2.1.4 In which group are the elements, helium, neon and argon found? (1)

2.1.5 Write down the SYMBOL of the element which has 17 protons. (1)

2.2 For each diagram below, indicate whether it represents an ELEMENT or a COMPOUND. Only write down the number (2.2.1 to 2.2.3) and ELEMENT or COMPOUND.

Diagram	ELEMENT OR COMPOUND?
	2.2.1
	2.2.2
	2.2.3

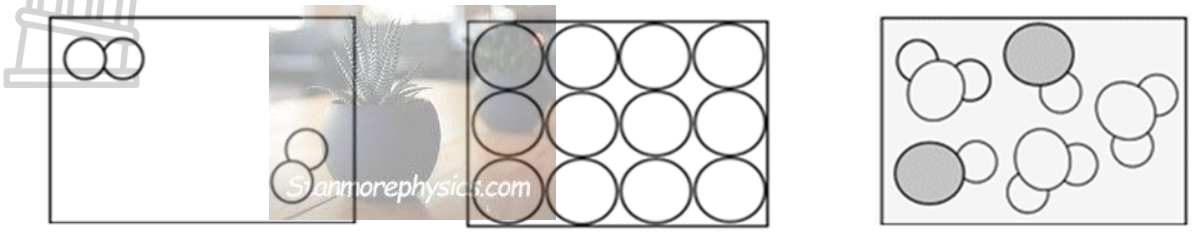
(3)

2.3 Define a compound. (2)

[10]

QUESTION 3

The particle model of matter can be used to represent different substances. Examples are illustrated in diagrams A, B and C below.



3.1 Which diagram represents a pure substance that consists of diatomic molecules? Give a reason for your answer. (2)

3.2 Identify the states of matter shown in diagrams B and C and compare the strengths of the forces that exist between the molecules of substance B with the forces that exist between the molecules of substance C. (3)

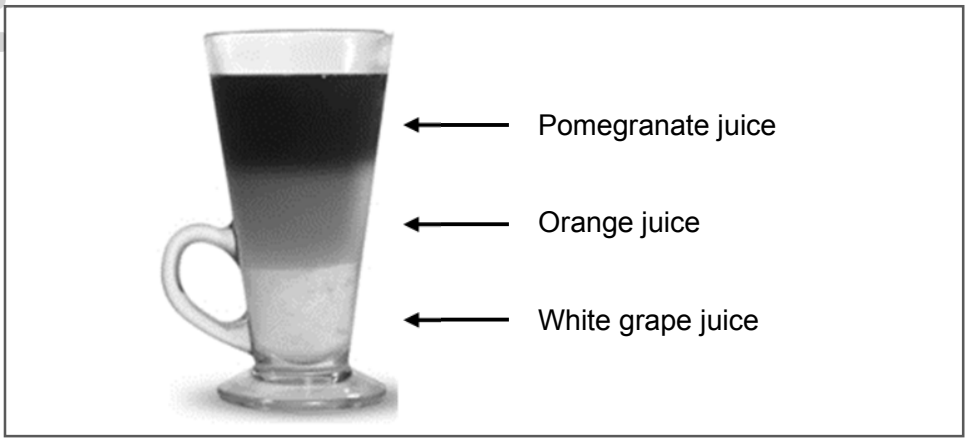
3.3 How many types of molecules are found in diagram C? (1)

3.4 Which diagram represents particles with the highest average kinetic energy? Explain your answer in terms of the particle model of matter. (2)

3.5 Explain why diffusion does not take place in diagram B? (2)
[10]

QUESTION 4

4.1 A man orders a drink in a restaurant. When the waiter serves his drink, he notices that three different layers of liquids are visible, as shown in the diagram below. Study the diagram and answer the questions that follow.



4.1.1 Define the term density. (2)

4.1.2 Which one of the three layers in the diagram, has the lowest density? (1)

4.1.3 Will the density of matter INCREASE or DECREASE when it is heated? Explain your answer by referring to the definition of density. (2)

4.2 A cube of ice is added to a glass of water. The following information about the water and the cube of ice is available:

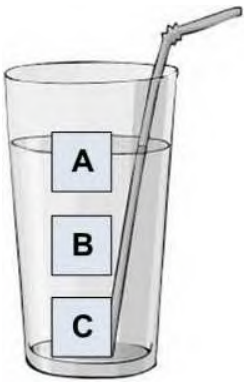
	Volume in cm^3	**Mass in g**
Ice cube	70,0	64,2
Liquid water	64,2	64,2

4.2.1 Calculate the density of the water by using the formula:

$$\textbf{Density} = \frac{\textbf{mass}}{\textbf{volume}}$$ (2)

4.2.2 Calculate the density of the ice cube, using the same formula. (2)

4.2.3 Where within the glass of water would you expect to find the ice cube?



Choose between position A, B or C. Give a reason for your answer based on the calculations done in the previous questions. (2)

[11]

QUESTION 5

The ice cubes in the diagram below represent matter in the solid state (solid phase). Answer the questions that follow.

Ice cubes (solid state)

5.1 Why does matter in a solid state have a definite shape? (1)

5.2 Explain why a solid CANNOT be compressed. (2)

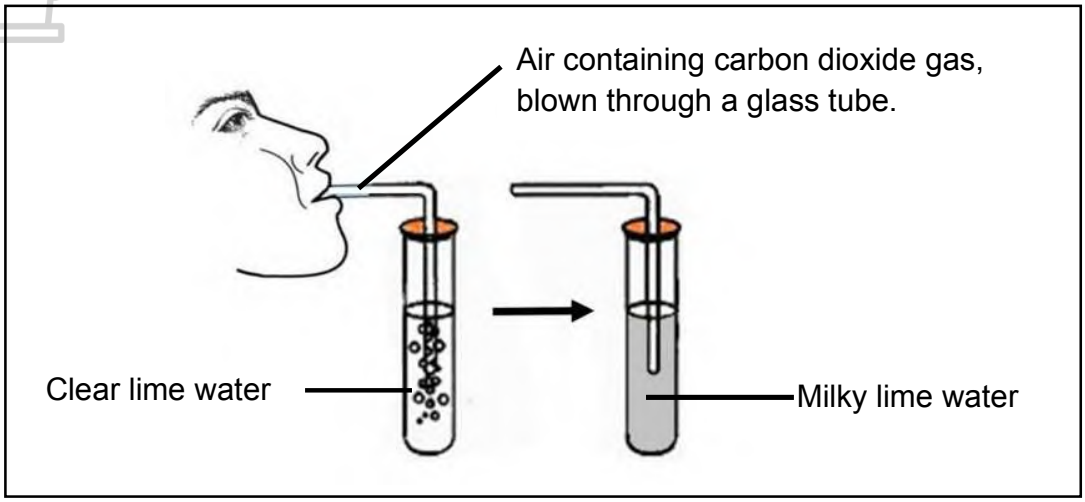
5.3 Describe the movement of the particles in an ice cube. (1)

5.4 What phase change will occur if the ice cubes are heated by the sun or any other energy source? (1)

[5]

QUESTION 6

The following diagram illustrates a chemical reaction that takes place when air containing carbon dioxide gas is blown through clear limewater in a test tube. The limewater turns milky.



6.1 What OBSERVATION made during the experiment serves as proof that a chemical reaction has occurred? (1)

6.2 Give the NAME of a REACTANT in this chemical reaction. (1)

6.3 Give the DEFINITION of the PRODUCT in a chemical reaction. (1)

6.4 Choose and write down only the words within the brackets that make the following statement TRUE:

(Burning a piece of paper / Melting ice / Dissolving salt in water) is an example of a chemical reaction). (1)

[4]

TOTAL SECTION B: 40
GRAND TOTAL: 50

Periodic Table of the Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 51.99	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.63	33 As 74.92	34 Se 78.97	35 Br 79.90	36 Kr 84.80
37 Rb 84.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc 98.91	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6	53 I 126.90	54 Xe 131.25
55 Cs 132.91	56 Ba 137.33	57-71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po [208.98]	85 At 209.99	86 Rn 222.02
87 Fr 223.02	88 Ra 226.03	89-103	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [269]	109 Mt [268]	110 Ds [269]	111 Rg [272]	112 Cn [277]	113 Uut unknown	114 Fl [289]	115 Uup unknown	116 Lv [298]	117 Uus unknown	118 Uuo unknown

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm 144.91	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.06	71 Lu 174.97
89 Ac 227.03	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu 244.06	95 Am 243.06	96 Cm 247.07	97 Bk 247.07	98 Cf 251.08	99 Es [254]	100 Fm 257.10	101 Md 258.1	102 No 259.10	103 Lr [262]

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GRADE 8

NATURAL SCIENCES

MEMORANDUM

MARKS: 50

This memorandum consists of 5 pages.

SECTION A

QUESTION 1

1.1.1 D ✓ (1)
1.1.2 B ✓ (1)
1.1.3 C ✓ (1)
1.1.4 D ✓ (1)
1.1.5 A ✓ (1)
[5]

1.2.1 C ✓ (1)
1.2.2 D ✓ (1)
1.2.3 E ✓ (1)
1.2.4 A ✓ (1)
1.2.5 B ✓ (1)
[5]

TOTAL SECTION A: 10

SECTION B

QUESTION 2

2.1.1 Periods ✓ (1)

2.1.2 Magnesium ✓ (NO mark is awarded for the symbol, Mg) (1)

2.1.3 13 ✓ (1)

2.1.4 Group 18✓ (He, Ne and Ar appear in group 18 on the Periodic Table provided.) (1)

2.1.5 Cℓ or Cl✓ (1)

2.2.1 Compound ✓ (1)

2.2.2 Element ✓ (1)

2.2.3 Compound ✓ (1)

2.3 A compound is a substance that consists of atoms✓ from two or more different elements✓ chemically bonded together. (2)
[10]

QUESTION 3

3.1 A✓
Each molecule consists of 2 atoms from the same element.✓ (2)

3.2 B = Solid✓
C = Liquid✓
The forces between the solid particles (B) are STRONGER than the forces between the liquid particles (C). ✓ (3)

3.3 Two✓ types (1)

3.4 A✓
The open spaces between the particles of a gas are the largest.✓
OR
The forces of attraction between the particles of a gas are the weakest and the particles can move freely. ✓ (2)

3.5 The open spaces between the particles of a solid (B) are very small✓ and therefore the particles are limited to move (diffuse)✓ freely.
OR
The strong forces of attraction that exist between the particles of a solid (B) keep the particles in fixed positions,✓ preventing them to move (diffuse)✓ freely. (2)
[10]

QUESTION 4

4.1.1 Density is defined as the mass✓ per unit volume✓ of a substance. (2)

4.1.2 Pomegranate (juice) ✓ (1)

4.1.3 Decrease✓
When exposed to heat, the volume of the substance will increase, while the mass remains the same.✓ (2)

4.2.1 Density of water = $\frac{\text{mass}}{\text{volume}}$

$= \frac{64,2}{64,2}$ ✓

$= 1\ g/cm^3$ ✓ (2)

4.2.2 Density of ice cube = $\frac{\text{mass}}{\text{volume}}$

$= \frac{64,2}{70}$ ✓

$= 0,92\ g/cm^3$ ✓ (2)

4.2.3 A✓
The density of the ice cube (0,92 g/cm^3) is lower/less than the density of water (1 g/cm^3) and will float on the water.✓ (2)
[11]

QUESTION 5

5.1 The particles in a solid are packed in an orderly way.✓
OR
The particles in a solid are closely packed in a regular arrangement.✓
OR
The particles are arranged in a fixed grid.✓ (1)

5.2 There are no/very small open spaces✓ between the solid particles, therefore, the particles' movement / compressibility is limited. ✓ (2)

5.3 The particles inside an ice cube, which is in the solid state, don't move; they are only able to vibrate✓ in fixed positions. (1)

5.4 Solid to liquid ✓ (1)
[5]

QUESTION 6

6.1 A change in colour can be noticed.✓
(Lime water turns milky.)
OR
The formation of a white precipitate (solid substance).✓ } **(Any 1 for 1 mark)**

Do not accept: Formation of a gas (bubbles).
A change in temperature. (1)

6.2 Carbon dioxide✓
OR Clear lime water✓
OR Calcium hydroxide solution✓ (chemical name for lime water)
(Any 1 for 1 mark) (1)

6.3 The substance that is formed / produced during a chemical reaction.✓ (1)

6.4 Burning paper✓ (1)
[4]

TOTAL SECTION B: 40
GRAND TOTAL: 50