education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 9

NATURAL SCIENCES

JUNE 2024

Marks : 60

Duration: 90 minutes

This question paper consists of 9 pages and an Annexure.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions for each question.
6. All the drawings should be in pencil, neat and fully labelled.
7. A non-programmable calculator, protractors and compasses may be used where applicable.
8. Write neatly and legibly.

SECTION A

QUESTION 1

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

1.1.1 The smallest particles that make up matter are known as …

A molecules.
B atoms.
C elements
D compounds. (1)

1.1.2 Group 1 elements are soft metals that react violently with water and oxygen. These metals are called …

A transition metals.
B alkali metals.
C noble gases.
D alkali earth metals. (1)

1.1.3 If a solution is acidic, it can be neutralized by adding …

A heat.
B strong acid.
C weak acid.
D a base. (1)

1.1.4 A chemical reaction in which an acid react with a base to produce salt and water.

A Rusting
B Corrosion
C Neutralisation
D Combustion (1)

1.1.5 Identify a chemical reaction which is balanced from those provided below:

A $H_2 + O_2 \rightarrow H_2O$
B $H + O \rightarrow H_2O$
C $2H_2 + O_2 \rightarrow 2H_2O$
D $H_2O + O_2 \rightarrow 2H_2O$ (1)

[5]

1.2 Give ONE word/term for each of the following statements. Write only the word/term next to the question number.

1.2.1 Reactions that involve the burning of substances. (1)

1.2.2 Positively charged particles within an atom. (1)

1.2.3 A chemical equation where the reactants and the products have the same number of atoms of each element. (1)

1.2.4 Horizontal rows on the periodic table. (1)

1.2.5 A product of a chemical reaction between a metal and oxygen. (1)

[5]

1.3 Choose the TERM in COLUMN B that best matches the statement in COLUMN A. Write ONLY the matching letter (A–H) next to the question number (1.3.1-1.3.5), eg. 1.3.7 G

COLUMN A		COLUMN B
1.3.1	Arrangement of all the known elements	A Indicator
1.3.2	A substance that changes colour depending on the pH of the solution in which it is placed	B Atomic number
1.3.3	Number of protons in the nucleus of an atom.	C Products
1.3.4	Substances that react together in a chemical reaction.	D Periodic Table
1.3.5	Elements that have properties of metals and non-metals.	E Reactants
		F Semi metals
		G Alkali metals

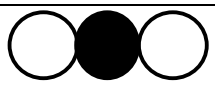
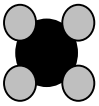
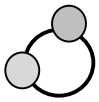
[5]

TOTAL SECTION A 15

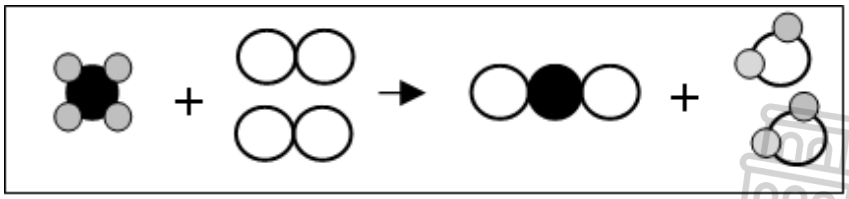
SECTION B

QUESTION 2

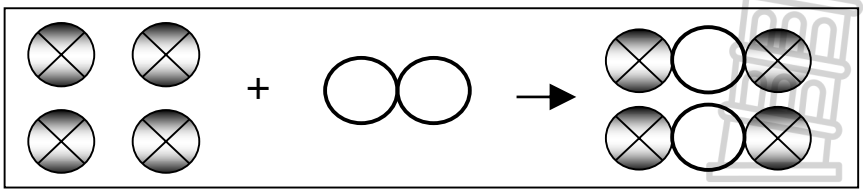
2.1 Study the information in the table below and answer the questions that follow.

NAME OF SUBSTANCE	FORMULA	STRUCTURE USED TO REPRESENT MOLECULES OF THE VARIOUS SUBSTANCES
Carbon dioxide	CO_2	
Methane	CH_4	
Oxygen gas	O_2	
Water	H_2O	
Sodium	Na	

Use the information in the table and write BALANCED CHEMICAL EQUATIONS for the reactions represented by the following structures:

2.1.1 

(3)

2.1.2 

(3)

[6]

3.1 The following is an example of a balanced chemical equation:

$CO + H_2O \longrightarrow CO_2 + H_2$

3.1.1 Provide the SCIENTIFIC NAME given to all the substances on the right-hand side of the arrow in a chemical equation. (1)

3.1.2 Provide NAMES of the two products which are the results of the above chemical reaction. (2)

[3]

QUESTION 4

4.1

When certain metals react with oxygen in the presence of moisture they corrode. When a spanner, consisting mainly of iron is left outside in the rain, a thin layer of a reddish-brown powder starts to form on its surface within a few weeks.

4.1.1 Name the PROCESS that take place when iron reacts with oxygen in the presence of moisture. (1)

4.1.2 Provide the COMMON NAME given to the reddish- brown powder that is observed after a few weeks. (1)

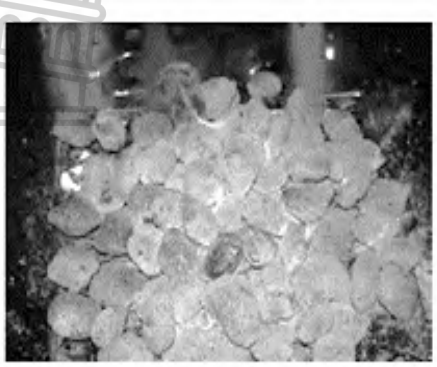
4.1.3 Suggest three ways in which the process named in 4.1.2 can be prevented. (3)

4.1.4 Use chemical formula to write a BALANCED CHEMICAL EQUATION for the above chemical reaction. (4)

[9]

QUESTION 5

5.1 Study the diagram below and answer the questions based on it:



Coals burning in a fire.

Carbon (coal is mainly carbon) burns in enough oxygen with a bright luminous yellow flame and produce a gas. The gas is invisible and has no smell.

5.1.1 Explain what happens when a non-metal reacts with oxygen. (2)

5.1.2 Name the substance, which is a source of carbon that can be used for the above experiment. (1)

5.1.3 Name the invisible gas product. (1)

5.1.4 Write the chemical formula of the PRODUCT. (1)

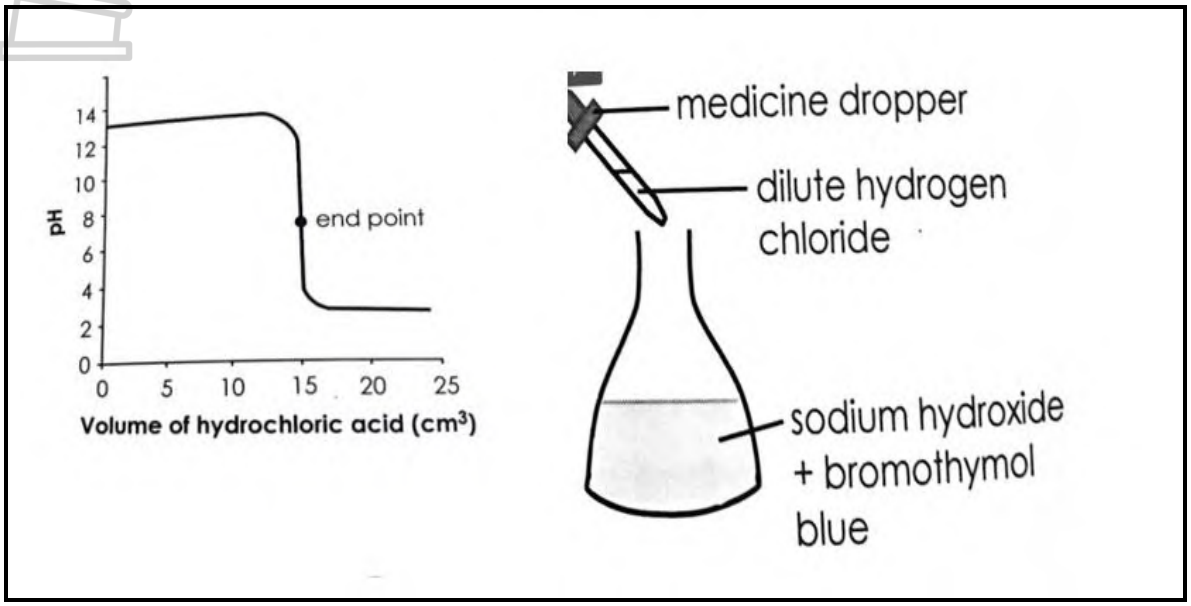
5.1.5 Explain how can one test for the product to prove that this specific product was formed. (2)

5.1.6 Name the environmental problem that is likely caused by people burning too much fuel that contains carbon. (2)

[9]

QUESTION 6

6.1 The following graph represents the change in pH of a 25cm^3 sodium hydroxide solution as dilute hydrogen chloride is being added to it. The indicator bromothymol blue was added beforehand to the sodium hydroxide solution.



6.1.1 State the possible hypothesis for this experiment. (2)

6.1.2 Identify the dependent variable. (1)

6.1.3 Identify the independent variable. (1)

6.1.4 Give the initial pH of the sodium hydroxide, before adding hydrochloric acid. (1)

6.1.5 Name the pH of the content in the beaker at the end point. (1)

6.2 Neutralisation reactions form a solution that has a neutral solution.

6.2.1 Name ANY THREE (real life) uses of neutralisation reactions. (3)

6.3 Complete the following chemical reactions of acids and bases:

6.3.1 $HCl + NaOH \rightarrow \ldots + H_2O$ (1)

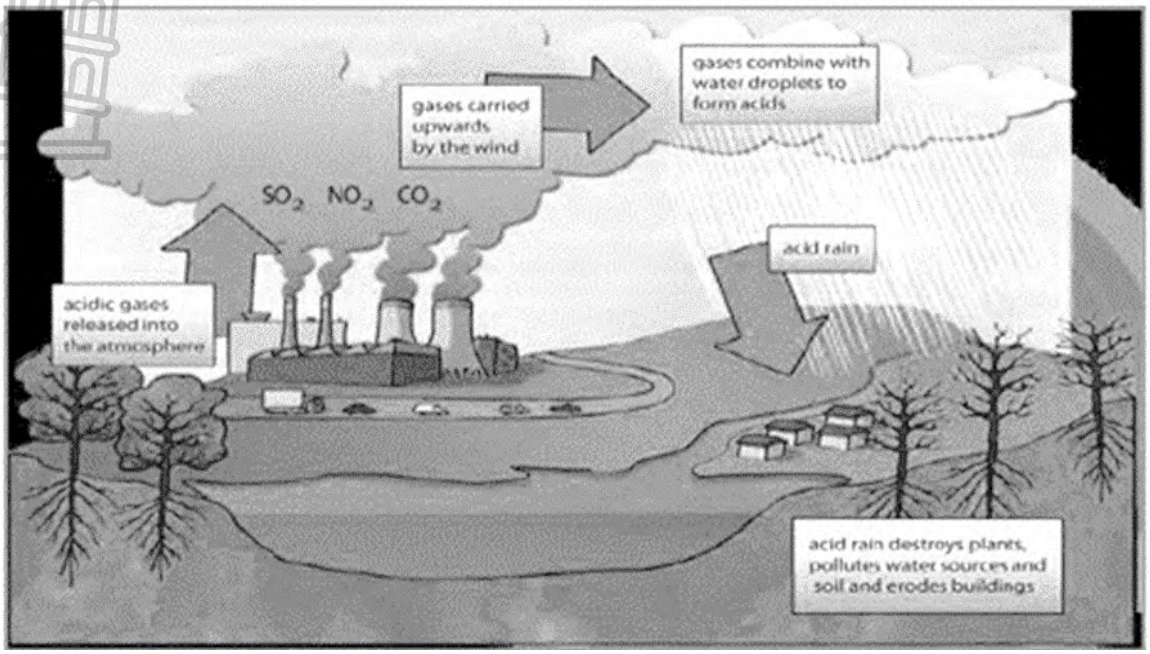
6.3.2 $H_2SO_4 + Mg(OH)_2 \rightarrow \ldots + 2H_2O$ (1)

[11]

QUESTION 7

ACTIVITIES THAT LEAD TO ACID RAIN

7.1



7.1.1 Identify one of the gases that contribute to the formation of acid rain. (1)

7.1.2 Name at least two sources of these gases. (2)

7.1.3 Explain how acid rain affect the environment negatively. (2)

7.1.4 Suggest one possible solution to the formation of acid rain. (2)

[7]

TOTAL SECTION B: 45
GRAND TOTAL: 60

ANNEXURE A: PERIODIC TABLE

	1A 1	2A 2						8B			1B 11	2B 12	3A 13	4A 14	5A 15	6A 16	7A 17	8A 18
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg	3B 3	4B 4	5B 5	6B 6	7B 7	8	9	10	1B 11	2B 12	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110	111	112	113	114	115	116		

57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No

Department of Education

North West Province

REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 9

NATURAL SCIENCES
MARKING GUIDELINES
JUNE 2024

MARKS: 60

TIME : 90 minutes

These marking guidelines consist of 4 pages.

SECTION A			
QUESTION 1			
1.1	1.1.1	B✓	(1)
	1.1.2	B✓	(1)
	1.1.3	D✓	(1)
	1.1.4	C✓	(1)
	1.1.5	C✓	(1)
			[5]
1.2	1.2.1	Combustion.✓	(1)
	1.2.2	Protons.✓	(1)
	1.2.3	Balanced equation. ✓	(1)
	1.2.4	Periods.✓	(1)
	1.2.5	Metal oxide.✓	(1)
			[5]
	1.3.2	A ✓	(1)
	1.3.3	B ✓	(1)
	1.3.4	E ✓	(1)
	1.3.5	F ✓	(1)
			[5]
		TOTAL SECTION A:	**15**
SECTION B			
QUESTION 2			
2.1	2.1.1	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (reactants✓products✓balancing✓)	(3)
	2.1.2	$4Na + O_2 \rightarrow 2Na_2O$ (reactants✓products✓balancing✓)	(3)
			[6]
QUESTION 3			
3.1			
	3.1.1	Products. ✓	(1)
	3.1.2	Carbon dioxide. ✓ Hydrogen gas. ✓	(2)
			[3]
4.1	4.1.1	Corrosion	(1)
	4.1.2	Rust	(1)
4.1.3	**Three ways used to prevent rusting:** - Iron and steel can be painted.✓ - Iron and steel can be coated with a metal that do not rust.✓ - Electroplating by using chromium or zinc. ✓ - Water repellent oil can be used to protect machines. - Grease can be used. (Any 3)		(3)
4.1.4	$4Fe$✓ $+ 3O_2$✓ $\rightarrow 2Fe_2O_3$ ✓ ✓		(4)
			[9]

QUESTION 5			
5.1	5.1.1	A non-metal oxide is formed .✓ ✓	(2)
	5.1.2	Coal/ charcoal. ✓	(1)
	5.1.3	Carbon dioxide.✓	(1)
	5.1.4	CO_2. ✓	(1)
	5.1.5	Bubble the gas through clear lime water. ✓ If the lime water turns milky, ✓ it indicates that it is carbon dioxide.	(2)
	5.1.6	Global warming. ✓✓	(2)
			[9]
QUESTION 6			
6.1	6.1.1	The pH of sodium hydroxide increases when dilute hydrogen chloride is added to it, until the end point is reached. ✓✓ OR The pH of sodium hydroxide decreases when dilute hydrogen chloride is added to it, until the end point is reached. (Any relevant answer)	(2)
	6.1.2	pH. ✓	(1)
	6.1.3	Volume of hydrochloric acid .✓	(1)
	6.1.4	13. ✓	(1)
	6.1.5	pH = 7. ✓	(1)
6.2	6.2.1	Three uses of neutralisation reactions: - Soil treatment. ✓ - Indigestion. ✓ - Insect stings. ✓ - Waste from industries. ✓ (Any 3)	(3)
6.3	6.3.1	NaCl. ✓	(1)
	6.3.2	$MgSO_4$. ✓	(1)
			[11]
QUESTION 7			
7.1	7.1.1	Sulphur dioxide (SO_2); Nitrogen dioxide(NO_2); Carbon dioxide(SO_2). ✓ (Any one)	(1)
	7.1.2	Two sources of these gases: -Electricity generated in fossil fuels power stations. ✓ -Factories emitting smoke.✓ -Exhaust fumes from motor vehicles. -Natural disaster such as volcanoes. (any relevant answer)	(2)

	7.1.3	-Acid rain destroys trees and plants.✓✓ -It damages buildings. -It makes lakes and rivers more acidic. -It destroys aquatic life. -It corrodes cars, airplanes and steel bridges. (Any one)	(2)
	7.1.4	-Coal power stations can use filters in their smoke towers to reduce/remove sulphur gases before the smoke is released into the atmosphere. ✓✓ -The use of renewable energy sources will reduce reliance on coal and other fossil fuels, and this will reduce the emission of acid producing gases in the atmosphere. (Any relevant answer)	(2)
			[7]
		TOTAL SECTION C :	**45**
		GRAND TOTAL:	**60**