GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

# PROVINCIAL EXAMINATION

# JUNE 2024

# GRADE 9

## NATURAL SCIENCES

**TIME:** 2 hours

**MARKS:** 100

**14 pages**

**NAME AND SURNAME:** _____

**GRADE 9:** _____

| QUESTION | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| LEARNER'S MARK | | | | | | | | | | |
| MARKS | 7 | 7 | 6 | 15 | 20 | 8 | 16 | 10 | 11 | 100 |

## INSTRUCTIONS AND INFORMATION

1. Answer ALL questions in the spaces provided on the question paper.

2. This question paper consists of TWO SECTIONS A and B based on the prescribed content framework in the CAPS document.

3. Allocation of marks:

   SECTION A: 20
   SECTION B: 80

4. This examination paper consists of NINE questions.

5. All drawings should be done in pencil and labelled in blue ink only.

6. Write neatly and legibly.

## SECTION A

## QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Choose the correct option and write the correct letter (A – D) in the blocks provided.

1.1 The elements in the periodic table are arranged in:

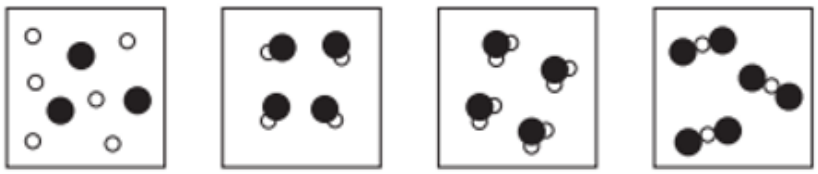
A Increasing order of their atomic mass
B Increasing order of their atomic number
C Decreasing order of their atomic number
D A random way selected by scientists (1)

1.2 Why are the elements Li and K in the same group on the periodic table?

A Their atomic numbers are the same.
B They have similar chemical properties.
C Both are non-metals.
D They do not react with oxygen. (1)

1.3 In the diagrams below, hydrogen atoms are represented by white circles, and oxygen atoms are represented by black circles.

Which of the diagrams best represents water?



**A** **B** **C** **D** (1)

1.4 Which of the following indicates a chemical reaction?

A Dissolving of a substance
B Filtration of a substance
C A colour change or formation of bubbles in a substance
D Melting or freezing of a substance (1)

1.5 Which of the following statements is true regarding a balanced chemical equation?

A The number of atoms of each element is the same on both sides of the equation.
B The coefficients represent the mass of the substances in the reaction.
C The subscripts can be changed to balance the equation.
D Balancing is not necessary for chemical equations. (1)

1.6 Which of the following substances is considered acidic on the pH scale?

A Lemon juice (pH 2)
B Baking soda (pH 8)
C Table salt (pH 7)
D Pure water (pH 7) (1)

1.7 Which is NOT evidence that a chemical reaction has occurred?

A Milk which tastes sour
B Steam that condenses on a cold window
C A strong odour coming from a broken egg
D A slice of raw potato changing colour (1)

**[7]**

**QUESTION 2: TERMINOLOGY**

Give the correct scientific term for each of the following descriptions. Write only the term in the spaces provided.

2.1 The classification system for the elements which make up matter and materials in the world

_____ (1)

2.2 Items on the left of a chemical equation

_____ (1)

2.3 The substance formed when carbon is burnt completely in the presence of oxygen

_____ (1)

2.4 The name of the process where the exposed surface of a metal reacts with oxygen

_____ (1)

2.5 When phosphorus reacts with oxygen, which product is commonly produced and used in matches?

_____ (1)

2.6 A chemical reaction where a strong acid reacts with a strong base to produce a salt

_____ (1)

2.7 A reaction which takes place in the presence of oxygen to produce heat.

_____ (1)

**[7]**

**QUESTION 3: MATCHING ITEMS**

Choose an item from COLUMN B that matches a statement in COLUMN A. Write only the letter (A – I) next to the question numbers (3.1 to 3.6) in the space provided:

| COLUMN A | COLUMN B | |
|---|---|---|
| 3.1 Diatomic molecule | A Rusting | 3.1 |
| 3.2 The process that weakens a metal | B 7 | 3.2 |
| 3.3 When you mix an equal volume of lemon juice (pH of 2) with a solution of sodium hydroxide (pH of 12). The expected pH will be … | C Solid<br>D Gas<br>E $CaCO_3$ | 3.3 |
| 3.4 The substance used in agriculture to make the soil less acidic. | F Chlorine | 3.4 |
| 3.5 The state of matter of non-metal oxides at room temperature. | G Carbon<br>H 14 | 3.5 |
| 3.6 A non-metal that is essential for the respiration of living organisms and forms $CO_2$ when it reacts with oxygen | I Product | 3.6 |

**[6]**

**TOTAL SECTION A: 20**

## SECTION B

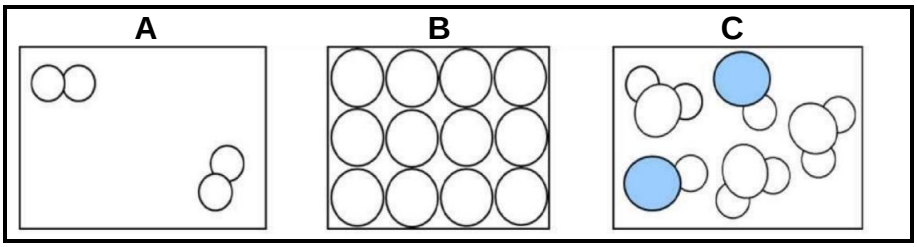
## QUESTION 4: COMPOUNDS

4.1 Fill in the missing words

| Chemical formula | Names of elements in the substance | Name of compound | Fixed ratio of elements |
|---|---|---|---|
| NaCl | Sodium and Chlorine | Sodium Chloride | 1 Sodium : 1 Chlorine |
| $Li_2O$ | **4.1.1** | **4.1.3** | **4.1.4** |
| | **4.1.2** | | |
| $NH_3$ | **4.1.5** | Ammonia | **4.1.7** |
| | **4.1.6** | | |

(7)

4.2 Study the diagram below and answer the questions that follow.




4.2.1 Which diagram, **A**, **B,** or **C**, represents a diatomic molecule? Give a reason for your answer.

_____

_____ (2)

4.3 Write down the balanced equations for the following reactions:

4.3.1 $Na + Cl_2 \rightarrow NaCl$

_____ (2)

4.3.2 $H_2 + Br_2 \rightarrow HBr$

_____ (2)

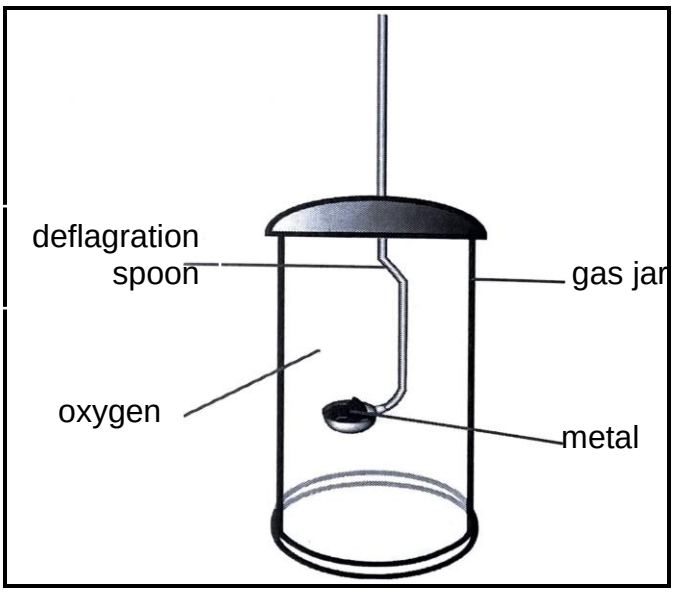
4.3.3 $N_2 + O_2 \rightarrow NO$

_____ (2)

**[15]**

## QUESTION 5: REACTION OF METALS WITH OXYGEN

5.1 A group of learners set up an experiment to investigate the reaction of oxygen with metals, as shown in the figure below.




They recorded their observation using the table below:
Complete the table using your knowledge.

| | Sodium | Iron |
|---|---|---|
| Appearance of reactants | **5.1.1** | **5.1.2** |
| Description of the product | **5.1.3** | **5.1.4** |
| Colour of flame | **5.1.5** | **5.1.6** |
| How is it stored in the laboratory? | **5.1.7** | |

(7)

5.2 5.2.1 Write down the balanced picture equation for the reaction of iron and oxygen.

| | |
|---|---|
| Picture equation:<br>Key for oxygen.<br><br>Key for iron | |

(4)

5.2.2 Write down the balanced chemical equation for the reaction of iron and oxygen.

_____

_____

_____ (3)

5.3 Define the term *rusting*.

_____

_____ (2)

5.4 Study the following pictures, A – D, and illustrate which technique is applied to prevent rust.

| A Palisades (metal fence) | B Car door handle | C Aluminium bucket | D Wheel rims |
|---|---|---|---|
|  |  |  |  |

A _____

B _____

C _____

D _____ (4)

**[20]**

## QUESTION 6: REACTION OF NON-METALS WITH OXYGEN

Sulphur burns easily. It is an ingredient of gunpowder and fireworks.



**[Source: hppts://image.app.goo.gl/xFVY3sk]**

6.1 What is the natural colour of sulphur?

_____ (1)

6.2 What colour flame does sulphur produce when it burns?

_____ (1)

6.3 The product of the reaction is a colourless gas with a pungent and suffocating smell. Name this product.

_____ (1)

6.4 The product of the reaction can be used commercially as a preservative. Name TWO food products that can contain this product as a preservative.

_____

_____ (2)

6.5 Write down the balanced chemical equation for the reaction mentioned above.

_____

_____

_____ (3)
**[8]**

## QUESTION 7: ACIDS, BASES, AND pH VALUES

7.1 Read the following text and answer the questions that follow.

In the recent floods in KwaZulu-Natal in 2022, most of the villages were destroyed by floods. The municipal infrastructure that supplies water to the community was flooded completely. These communities did not have a fresh water supply because of uprooted pipes. The only water source available was a heavily flooded well. The well was full of sand because it had not been in use for some time. The people from some of the surrounding areas had no alternative source of clean drinkable water except for the water from the well that was full of sand, stones and waste material. They had to use this contaminated water for a short while, because the bridges were completely destroyed by the floods. Some of the Grade 9 learners suggested testing the pH of the water sample taken from the same well using different indicators. They poured equal amounts of the water sample in three different bottles as indicated below. Group A added Red cabbage water into Bottle A, Group B added Phenolphthalein into Bottle B, and group C added Bromothymol blue into Bottle C.



**Bottle A**



**Bottle B**



**Bottle C**

**[Resource: https://freepnging.com/thumb/water-bottle]**

7.1.1 Define an *indicator*.

_____

_____ (2)

7.1.2 Formulate an investigative question for this experiment.

_____

_____ (2)

7.1.3 Identify the following:

(a) One controlled variable

_____ (1)

(b) Dependant variable

_____ (1)

7.2 The table below shows their observations after the different indicators were added to the water in each test tubes.

| **Test tube** | What is the colour of the indicator in the sample if the water is acidic? | What is the colour of the indicator in the sample if the water is basic? |
|---|---|---|
| A | **7.2.1** | Blue, green, yellow |
| B | Colourless | **7.2.2** |
| C | **7.2.3** | **7.2.4** |

(4)

7.3 Suggest the substances which the leaners may add to the water if the sample is found to be acidic in order to make it safe for consumption. Give a reason for your choice.

_____

_____

_____

_____ (4)

7.4 Mention TWO possible waterborne diseases the people in KwaZulu-Natal may suffer from due to contaminated water.

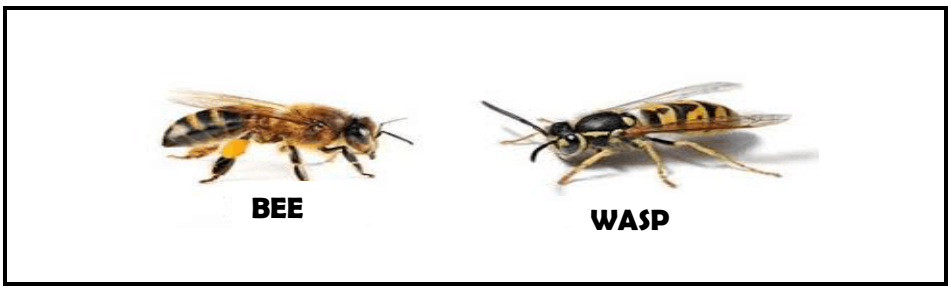
_____

_____ (2)

**[16]**

## QUESTION 8: ACIDS AND BASE REACTIONS

8.1 It was Friday the 13th and Vincent had had an unlucky day. He was stung twice by insects. At first, he was stung by a wasp, so he put some vinegar on the sting. Later he was stung by a bee, so he mixed bicarbonate of soda with water and applied it to the sting. The lucky part of the story is that Vincent was an attentive chemistry student, so he knew how to neutralise the stings.




Determine which sting is acidic and which sting is basic.

_____

_____ (2)

8.2 The picture below shows an example of a situation in everyday life where neutralisation reactions are useful. The person in the picture has indigestion.



8.2.1 What, do you think, caused the indigestion?

_____

_____

_____

_____ (2)

8.2.2 Suggest ONE way in which his indigestion can be treated.

_____

_____ (2)

8.2.3 Explain why he should not be given a fizzy drink.

_____

_____ (2)

8.2.4 Name ONE way that indigestion can be prevented.

_____

_____ (2)

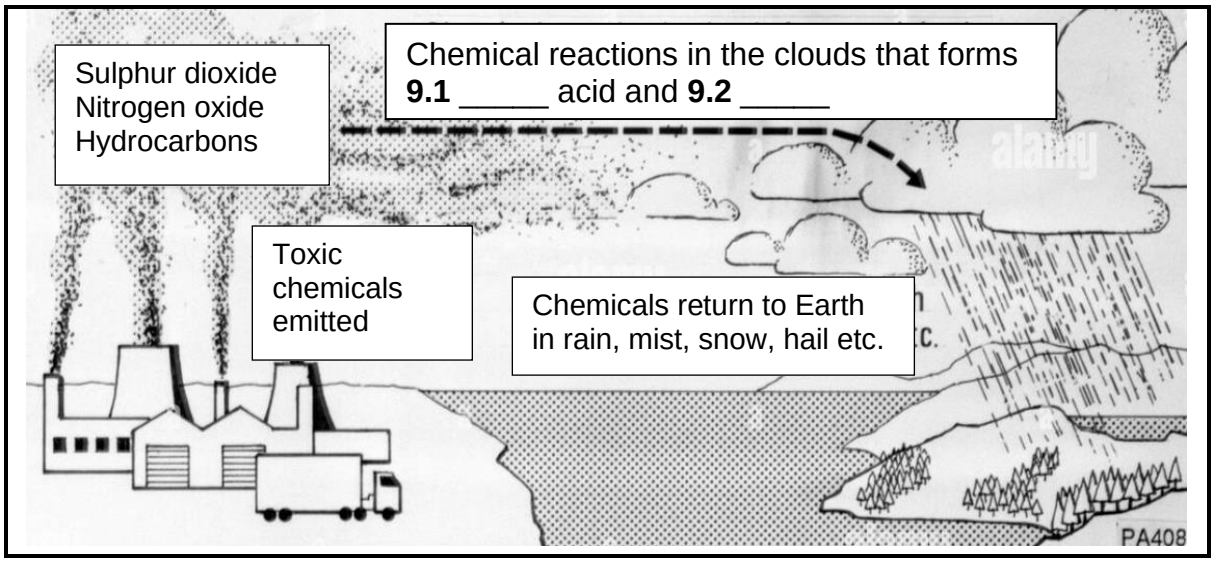
**[10]**

**QUESTION 9: REACTION OF ACIDS WITH BASES**

The burning of wood and fossil fuels releases carbon dioxide, nitrogen oxide and sulphur dioxide into the atmosphere.

Study the diagram below to deduce the NAMES of the products which are formed in the clouds as result of this.

Use the spaces below to complete the sentence shown in the diagram below.




**[Source: https://image.app.goo.gl/9RKSaQk9]**

9.1 _____ (1)

9.2 _____ (1)

9.3 Write the chemical formulae of the two acids formed in QUESTIONS 9.1 and 9.2.

_____

_____ (2)

9.4 Mention TWO negative impacts of acid rain on the environment.

_____

_____ (2)

9.5 Underline the correct word.

When an acid reacts with the metal oxide, the type of salt formed is:

ACIDIC/BASIC/NEUTRAL (1)

Write a balanced chemical equation for the reaction of:

Hydrochloric acid + magnesium oxide → magnesium chloride + water

_____

_____

_____

_____ (4)

**[11]**

**TOTAL SECTION B: 80**

**TOTAL: 100**

**END**