



**GAUTENG PROVINCE**  
EDUCATION  
REPUBLIC OF SOUTH AFRICA

# **PROVINCIAL EXAMINATION**

## **NOVEMBER 2023**

### **GRADE 10**

### **MARKING GUIDELINES**

<b>PHYSICAL SCIENCES: CHEMISTRY (PAPER 2)</b>
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**6 pages**

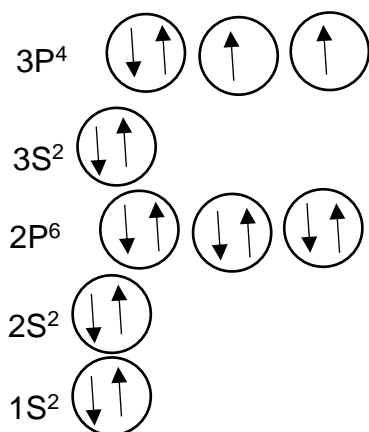
## QUESTION 1 MULTIPLE-CHOICE QUESTIONS

- 1.1 D ✓✓ (2)
- 1.2 C ✓✓ (2)
- 1.3 D ✓✓ (2)
- 1.4 C ✓✓ (2)
- 1.5 A ✓✓ (2)
- 1.6 B ✓✓ (2)
- 1.7 A ✓✓ (2)
- 1.8 B ✓✓ (2)
- 1.9 C ✓✓ (2)
- [18]**

## QUESTION 2

- 2.1 2.1.1  $\text{OH}^-$  ✓ (1)
- 2.1.2 Si ✓ (1)
- 2.1.3 Ni ✓ (1)
- 2.1.4 C ✓ (1)
- 2.1.5 Brass ✓ (1)
- 2.1.6  $\text{Br}_2$  ✓ (1)
- 2.2 C has greater ionisation energy than Si. ✓ (1)

2.3



✓ energy level 1 ✓ energy level 2 ✓ energy level 3 (3)

2.4 2.4.1 Free of water. ✓✓ (2)



$$10\text{g} \quad 6,4\text{g} \quad \Delta m = 10 - 6,4 = 3,6\text{g} \checkmark$$

$$n(\text{CuSO}_4) = m/M = \frac{6,4}{159,5} \checkmark = 0,04\text{ mol}$$

$$n(\text{H}_2\text{O}) = \frac{3,6}{18} \checkmark = 0,2\text{ mol}$$

$$n(\text{CuSO}_4) : n(\text{H}_2\text{O})$$

$$0,04 : 0,2$$

$$1 : 5$$

$$\therefore x = 5 \checkmark$$

(4)  
[16]**QUESTION 3**

3.1 The temperature at which a solid, given sufficient heat, becomes a liquid. ✓✓ (2)

3.2  $1,013 \times 10^5$  Pa or 101,3 kPa or 1 atm or 1 bar or pressure at sea level ✓ (1)

3.3 Thermometer ✓ (1)

3.4 Liquid ✓ (1)

3.5 – Temperature remains constant, phase change is taking place (liquid to gas). ✓  
 – All the heat absorbed is used to weaken the intermolecular forces. ✓  
 – Kinetic energy remains constant, but potential energy increases. ✓ (3)

3.6 – Ethanol will boil faster than water. ✓  
 – Ethanol boils at  $78^\circ\text{C}$  and water boils at a higher temperature,  $100^\circ\text{C}$  at standard pressure. ✓  
 – The water molecules need more energy to overcome the stronger forces. ✓ (3)

[11]

## QUESTION 4

- 4.1 Atoms of the same element, with the same number of protons but different number of neutrons. ✓✓ (2)
- 4.2 Sr ✓ (1)
- 4.3 2 ✓ (1)
- 4.4 – Atomic radius decreases across the period and increases down the group. ✓  
– Strontium's atomic radius is bigger than that of Magnesium. ✓ (2)
- 4.5 Average atomic mass =  $\frac{(84 \times 0,56) + (86 \times 9,86) + (87 \times 7) + (88 \times 82,58)}{100}$  ✓  
= 87,71  
≈ 88 ✓ (3)  
[9]

## QUESTION 5

- 5.1 The simplest whole-number ratio of atoms in a compound. ✓✓ (2)
- 5.2 5.2.1 0,73 g ✓ (1)
- 5.2.2  $n = \frac{m}{M}$  ✓
- $n = \frac{1,09}{12}$  ✓ = 0,09 mol C
- $n = \frac{0,18}{1}$  ✓ = 0,18 mol H
- $n = \frac{0,73}{16}$  ✓ = 0,046 mol O
- $\frac{0,09}{0,046} : \frac{0,18}{0,046} : \frac{0,046}{0,046}$  ✓
- 2 : 4 : 1
- Empirical formula = C<sub>2</sub>H<sub>4</sub>O ✓ (6)
- 5.3 Empirical formula molar Mass = 44 g.mol<sup>-1</sup> ✓  
ratio =  $\frac{88}{44} = 2$  ✓  
Molecular formula = C<sub>4</sub>H<sub>8</sub>O<sub>2</sub> ✓ (3)  
[12]

## QUESTION 6



6.2 Carbon (IV) oxide or carbon dioxide ✓ and  $\text{CO}_2$  ✓ (2)

6.3 6.3.1  $\text{CO}_2$  ;  $\text{H}_2\text{O}$  of  $\text{HCl}$  ✓✓ (Any TWO) (2)

6.3.2  $\text{NaCl}$  ✓ and  $\text{Na}_2\text{CO}_3$  ✓ (2)



6.5  $M(\text{Na}_2\text{CO}_3) = (2 \times 23) + 12 + (3 \times 16)$   
 $= 106 \text{ g.mol}^{-1}$  ✓✓ (2)

6.6  $n = \frac{m}{M}$  ✓  
 $n = \frac{3}{106}$  ✓  
 $n = 0,028 \text{ mol}$  ✓ (3)

6.7  $n = \frac{N}{N_A}$  ✓  
 $0,028 = \frac{N}{6,02 \times 10^{23}}$  ✓  $N = 1,7 \times 10^{22} \text{ formula units}$  ✓  
 $n(\text{Na}_2\text{CO}_3) : n(\text{O})$   
 $1 : 3$   
 $1,7 \times 10^{22} : 5,11 \times 10^{22} \text{ oxygen atoms}$  ✓ (4)

[21]

## QUESTION 7

7.1 The amount of substance containing the same number of elementary particles (atoms, ions or molecules) as there are atoms in 12 g of carbon-12. ✓✓ (2)

7.2  $45 \text{ cm}^3$  or  $0,045 \text{ dm}^3$  ✓✓ (2)

7.3 Bubbles/Effervescence of hydrogen gas in the conical flask. ✓ (1)

7.4  $n = \frac{V}{V_m}$  ✓  
 $= \frac{0,045}{22,4}$  ✓  
 $= 0,002 \text{ mol}$  or  $2,0 \times 10^{-3} \text{ mol}$  ✓ (4)

7.5  $n(\text{Mg}) : n(\text{H}_2)$

1 : 1

$0,002 : 0,002$  ✓

$$n = \frac{m}{M} \quad \checkmark$$

$$0,002 = \frac{m}{24} = \checkmark$$

$$m = 0,048 \text{ g}$$
 or  $0,05 \text{ g}$  ✓

(4)  
[13]

**TOTAL: 100**