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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

NOVEMBER 2023

GRADE 10

MARKING GUIDELINES

PHYSICAL SCIENCES: CHEMISTRY (PAPER 2)

6 pages

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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]

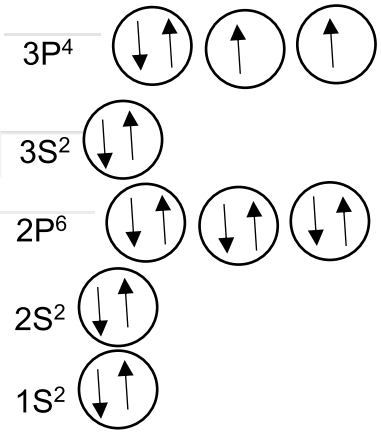
QUESTION 2

2.1	2.1.1	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	Br_2 ✓	(1)
2.2		C has greater ionisation energy than Si. ✓	(1)

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2.3



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

2.4 2.4.1 Free of water. ✓✓ (2)

2.4.2 $CuSO_4 \cdot x\ H_2O \rightarrow CuSO_4 + xH_2O$

10g 6,4g $\Delta m = 10 - 6,4 = 3,6$ g ✓

$n(CuSO_4) = m/M = \frac{6,4}{159,5}$ ✓ = 0,04 mol

$n(H_2O) = \frac{3,6}{18}$ ✓ = 0,2 mol

$n(CuSO_4) : n(H_2O)$

0,04 : 0,2

1 : 5

∴ x = 5 ✓ (4)

[16]

QUESTION 3

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

3.2 1,013 x 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 °C and water boils at a higher temperature, 100 °C at standard pressure. ✓
- The water molecules need more energy to overcome the stronger forces. ✓ (3)

[11]

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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 = $\frac{(84\times0,56)+(86\times9,86)+(87\times7)+(88\times82,58)}{100}$ ✓✓

= 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

Empirese formule = C_2H_4O ✓ (6)

5.3 Empirical formula molar Mass = 44 g.mol^{-1} ✓
ratio = $\frac{88}{44}$ = 2 ✓
Molecular formula = $C_4H_8O_2$ ✓ (3)
[12]

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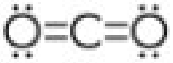
QUESTION 6

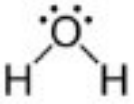
6.1 $Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$ ✓✓ (2)

6.2 Carbon (IV) oxide or carbon dioxide ✓ and CO_2 ✓ (2)

6.3 6.3.1 CO_2 ; H_2O of HCl ✓✓ (Any TWO) (2)

6.3.2 NaCl ✓ and Na_2CO_3 ✓ (2)

6.4 6.4.1  ✓✓ (2)

6.4.2  ✓✓ (2)

6.5 $M(Na_2CO_3) = (2 \times 23) + 12 + (3 \times 16)$
$= 106\ g.mol^{-1}$ ✓✓ (2)

6.6 $n = \frac{m}{M}$ ✓

$n = \frac{3}{106}$ ✓

n = 0,028 mol ✓ (3)

6.7 $n = \frac{N}{N_A}$ ✓

$0,028 = \frac{N}{6,02 \times 10^{23}}$ ✓ N = $1,7 \times 10^{22}$ formula units ✓

$n(Na_2CO_3) : n(O)$

1 : 3

$1,7 \times 10^{22} : 5,11 \times 10^{22}$ oxygen atoms ✓ (4)

[21]

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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 cm^3 or 0,045 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 mol or 2,0 x 10^{-3} mol ✓ (4)

7.5 n(Mg) : $n(H_2)$

1 : 1

0,002 : 0,002 ✓

$n = \frac{m}{M}$ ✓

$0,002 = \frac{m}{24}$ = ✓

m = 0,048 g or 0,05 g ✓ (4)
[13]

TOTAL: 100

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