

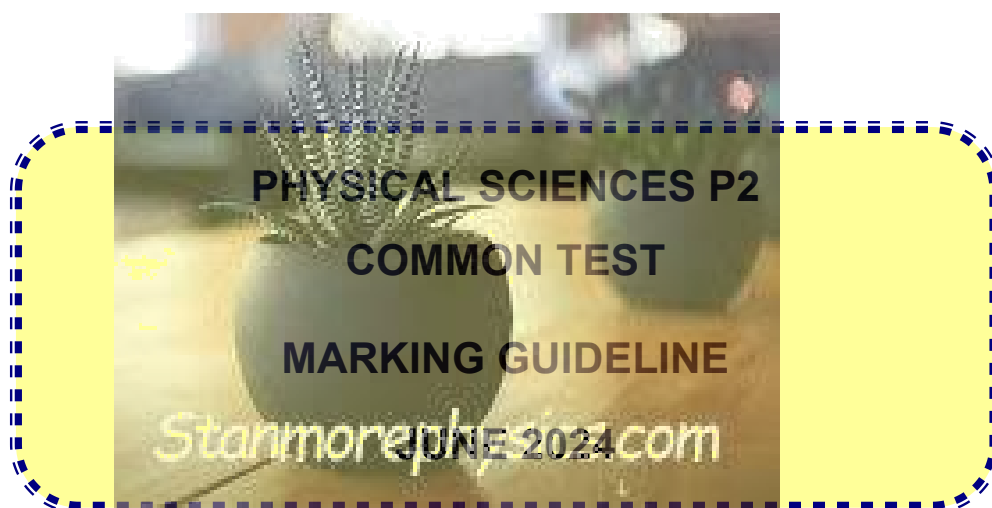


KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10



MARKS: 75

DURATION: 1½ hours

This marking guideline consists of 5 pages.



QUESTION 1:

- 1.1 C ✓✓ (2)
 1.2 C ✓✓ (2)
 1.3 A ✓✓ (2)
 1.4 B ✓✓ (2)
 1.5 D ✓✓ (2)
[10]

QUESTION 2

- 2.1
- 2.1.1 Oak (chip). ✓
 The density of oak is less than the density of water. ✓ (2)
- 2.1.2 Aluminium. ✓
 Aluminium has a lower density than lead. ✓
 For a constant mass, the density is inversely proportional to the volume. ✓ (3)
- 2.2
- 2.2.1 Pure Substance ✓ (1)
- 2.2.2 $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$ LHS ✓
 RHS ✓
 Balancing ✓ (3)
- 2.3
- 2.3.1 Physical (change) ✓ (1)
- 2.3.2 Decomposition ✓
 A single reactant is broken down into multiple products. ✓ (2)
- 2.4
- Mass of reactants = $2(14 + 1 \times 3) + 2 \times 1 + 32 + 16 \times 4$ ✓
 $= 132 \text{ g.mol}^{-1}$
 Mass of products = $2(14 + 4 \times 1) + 32 + 16 \times 4$ ✓
 $= 132 \text{ g.mol}^{-1}$
 Mass of reactants is equal to the mass of products. Therefore mass is conserved. ✓ (3)

[15]

QUESTION 3

3.1 Melting. ✓ (1)

3.2 Thermometer ✓ (1)

3.3 Crushed ice allows for easier transfer of heat energy from one particle to the next. ✓✓

or

Use crushed ice because it is easier for the thermometer to measure the temperature. ✓✓ (2)

3.4 The temperature of the substance increases. ✓
The average kinetic energy of the particles increases. ✓
Particles move faster. ✓ (3)

3.5 The water has reached room temperature ✓ and there isn't an external heat source. ✓ (2)

3.6 Liquid. ✓ (1)

[10]

QUESTION 4

4.1

4.1.1 A larger atomic radius results in lower first ionisation energy. ✓ (1)

4.1.2 As you move from left to right across a period the effective nuclear charge increase ✓
The force of attraction between the nucleus and the outer orbital increases. ✓

or

Cl has a smaller atomic radius than Mg. ✓✓ (2)

4.1.3 Decrease ✓
As you move down the group the atomic radius increases. ✓
The force of attraction between the nucleus and valence electrons decreases. ✓ (3)

4.1.4 The outermost energy level is full in noble gases ✓ resulting in a stable electronic configuration ✓

or

Noble gases have the smallest atomic radius ✓ for the elements in the same period. ✓ (2)

4.2 The energy released when an electron is attached to an atom or molecule to form a negative ion. ✓✓ (2)

4.3 Halogen ✓

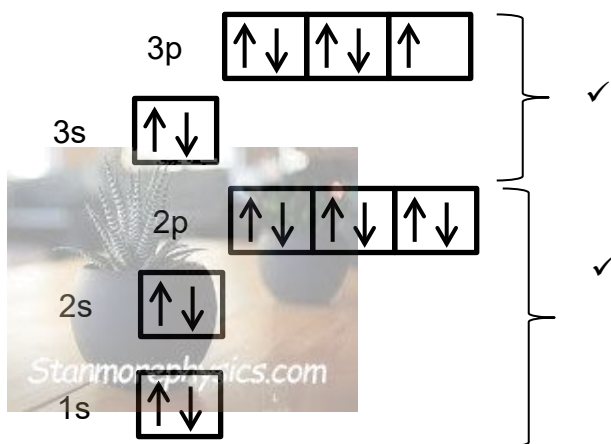
(1)
 [11]

QUESTION 5

5.1

5.1.1 18 ✓
 5.1.2

(1)



sp-notation: $1s^2 2s^2 2p^6 3s^2 3p^5$ ✓

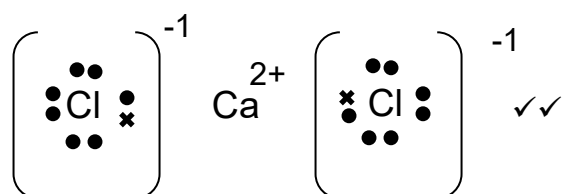
(3)

5.1.3 Ionic bonds ✓

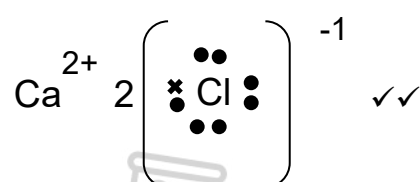
(1)

5.1.4

OPTION 1



OPTION 2



(2)

5.2 Let the 2nd isotope be Copper – X
 % Copper – X = 100 – 25 ✓ = 75%

$$63,5 = 65 \times \frac{25}{100} + X \left(\frac{75}{100} \right)$$

$$x = 63$$

$$\text{number of neutrons} = 63 - \underline{29} \checkmark$$

$$= 34 \checkmark$$

(6)

5.3

5.3.1 MgO ✓✓

(2)

5.3.2 (NH₄)₂Cr₂O₇ ✓✓

(2)

5.4 Copper (II) nitrate ✓✓ **Note:** Copper nitrate ✓

(2)

[19]

QUESTION 6

6.1

$$6.1.1 \quad M(\text{CaCO}_3) = 40 + 12 + 16 \times 3 \checkmark$$

$$= 100 \text{ g.mol}^{-1} \checkmark$$

(2)

Positive marking from 6.1.1

$$6.1.2 \quad n(\text{CaCO}_3) = \frac{m}{M} \checkmark$$

$$n(\text{CaCO}_3) = \frac{50}{100} \checkmark$$

$$n(\text{CaCO}_3) = 0,5 \text{ mol}$$

$$n(\text{CaCO}_3) = \frac{N}{N_A} \checkmark$$

$$0,5 = \frac{N}{6,02 \times 10^{23}} \checkmark$$

$$N = 3,01 \times 10^{23} \text{ molecules} \checkmark$$

(5)

$$6.2 \quad n(\text{CO}_2) = \frac{V}{V_m} \checkmark$$

$$0,5 = \frac{V}{22,4} \checkmark$$

$$V = 11,2 \text{ dm}^3 \checkmark$$

(3)

[10]

TOTAL: 75