higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PHYSICAL SCIENCE
(Second paper)
NQF LEVEL 2

24 November 2022

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 Thermal conductivity
1.2 Valence electrons
1.3 Solute
1.4 Fractional distillation
1.5 Transpiration

(5 × 1) **[5]**

QUESTION 2

2.1 B

2.2 H

2.3 G

2.4 F

2.5 D

(5 × 1) **[5]**

QUESTION 3

3.1 False
3.2 False
3.3 True
3.4 False
3.5 True

(5 × 2) **[10]**

QUESTION 4

4.1 D
4.2 B
4.3 D
4.4 D
4.5 C

(5 × 3) **[15]**

TOTAL SECTION A: 35

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SECTION B

QUESTION 5: MATTER AND MATERIALS

5.1	5.1.1	Sulphur	(1)
	5.1.2	Iron fillings and sand	(1)
	5.1.3	Carbon tetrachloride	(2)
	5.1.4	$(NH_4)_2SO_4$	(2)
	5.1.5	Silicon	(2)

5.2 Frying pans and pots are made of metal✓ because metal is a good conductor✓ that allows heat to be transferred✓ so that it can cook. The handles are good insulators✓ so that you do not burn your hands when you pick up a hot pot. (4)

5.3 5.3.1 The boiling point of a substance is the temperature✓ at which the substance changes from a liquid to gas.✓ (2)

5.3.2 Radon✓ and nitrogen✓ (2)

5.3.3 Cobalt (1)

5.3.4 Gas (2)

[19]

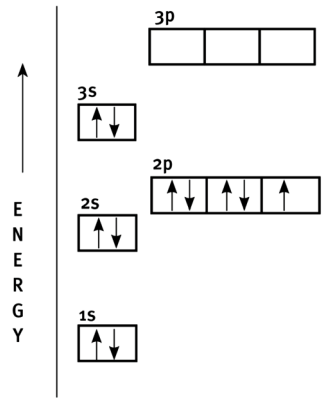
QUESTION 6: MATTER AND MATERIALS

6.1 6.1.1 O
6.1.2 4
6.1.3 2
6.1.4 16

(4 × 1) (4)

6.2 6.2.1 Ionic bond (1)

6.2.2



(2)

6.2.3  (4)

6.3 6.3.1 Isotopes are atoms of the same element, with the same number of protons, but with different numbers of neutrons✓✓ or the same atomic number but with a different mass number.✓✓ (2)

6.3.2 Neutrons (1)

6.3.3 19 (1)

6.4 6.4.1 Sodium carbonate
6.4.2 Calcium oxide
6.4.3 Sodium chloride
(3 × 2) (6)

6.5 6.5.1 $Ca(NO_3)_2$
6.5.2 $A\ell_2O_3$
6.5.3 NH_3
(3 × 2) (6)
[27]

QUESTION 7: CHEMICAL CHANGE

7.1 7.1.1 The heat capacity of a substance is the quantity of heat energy required to raise a mass✓ of the substance's temperature by 1 °C or 1 K.✓

7.1.2 Specific heat capacity is the amount of heat energy required to raise the temperature✓ of 1 kg of a substance by 1 °C or 1 K.✓
(2 × 2) (4)

7.2 7.2.1 $\Delta T = t_2 - t_1$
$= 90\ °C - 20\ °C$✓
$= 70\ °C$ ✓ (2)

7.2.2 $Q = m \times c \times \Delta T$
$m = \frac{Q}{C \times \Delta T}$
$= \frac{400 \times 10^3}{389 \times 70\ °C}$✓
$= 14{,}69\ kg$✓✓ (3)

7.3 7.3.1 Silicon dioxide is a pure substance.✓ It is a compound.✓
7.3.2 Argon is a pure substance.✓ It is an element.✓
7.3.3 Sand and stone form a heterogeneous mixture.✓ Composition is not uniform throughout the mixture.✓
(3 × 2) (6)
[15]

QUESTION 8: CHEMICAL CHANGE

8.1 8.1.1 An electrolyte is an ionic solution that allows electricity to pass through it or it is an ionic solution that conducts electricity. (2)

8.1.2 Electric current (1)

8.1.3 Dissociation is the process in which an ionic solid is broken up into ions when dissolved in water. (3)

8.1.4 $NaC\ell\ (s) \longrightarrow Na^+\ (aq) + C\ell^-\ (aq)$ (4)

8.2 8.2.1 Concentration is a measure of the amount of soluble/substance that is dissolved in a given volume of solvent✓✓ or the amount of substance dissolved in another substance, e.g. sugar dissolved in water. (2)

8.2.2 m = 35 g
volume = 250 cm^3 = 0,25 dm^3

$Mr(NH_4NO_3) = 14 + (1 \times 4) + 14 \times (3 \times 16)$
$= 80$ g/mol✓

$n = \frac{m}{Mr}$

$= \frac{35}{80\ g/mol}$

$= 0,44$ mol✓

$C = \frac{n}{V}$

$= \frac{0,44\ mol}{0,25\ dm^3}$✓

$= 1,76\ mol/dm^3$✓ (4)

8.3 m = 30 g

$Mr(Na_2SO_4) = (2 \times 23) + 32 + (16 \times 4)$
$= 142$ g/mol✓

$n = \frac{m}{Mr}$

$= \frac{30\ g}{142\ g/mol}$

$= 0,21$ mol✓ (4)

8.4 8.4.1 $2C_2H_6 + 7O_2 \longrightarrow 4CO_2 + 6H_2O$ (combustion reaction)

8.4.2 $2KC\ell O_3 \longrightarrow 2KC\ell + 3O_2$ (decomposition reaction)

(2 × 4) (8)
[28]

QUESTION 9: CHEMICAL SYSTEM AND INDUSTRY

9.1 Pollution is the process of making air, water, soil, etc. dangerously dirty and not suitable for people to use. (2)

9.2
- Acid rain caused by gases such as CO_2, SO_2, NO_2 and N_2O✓ dissolving in water vapour in the air✓
- Fertilisers and other chemicals dissolving in rain water✓ running into rivers✓ and dams✓
- Chemicals from industry being discharged straight into rivers and dams✓

(3 × 2) (6)

9.3
- Calcium hydrogen carbonate : $Ca(HCO_3)_2$✓
- Magnesium hydroxide carbonate : $Mg(HCO_3)_2$✓ (2)

9.4
- Magnesium sulphate
- Calcium sulphate (2)

[12]

QUESTION 10: CHEMICAL SYSTEM AND INDUSTRY

10.1 10.1.1 Evaporation
10.1.2 Condensation
10.1.3 Transpiration
10.1.4 Precipitation

(4 × 1) (4)

10.2 Energy lost/Energy released to the surrounding area/Cooling takes place/Particle moves faster (2)

10.3 SO_2✓ + H_2O✓ $\longrightarrow$ H_2SO_3✓ (3)

10.4 Disinfectant that kills germs and bacteria (2)

10.5
- Good solvent
- Controls the temperature of the earth
- Unique surface tension
- High boiling point
- Liquid at room temperature (Any 3 × 1) (3)

[14]

TOTAL SECTION B: 115
GRAND TOTAL: 150

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