higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

CHEMISTRY N4

24 JULY 2018

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 1.1.1 It has:
- directional properties
- molecules that are easily separated
- molecules are small with weak Van der Waal's forces
- molecules with a definite overall shape (4)

1.1.2
- generally electrolyte
- conduct electricity if dissolved in polar solvent (2)

1.1.3
- soluble in non – polar solvent
- chemical reaction of polar and covalent causes the structure to become ionised (2)

1.2 H_2, Cl_2, HCl, H_2O, HOCl and NH_3 (Any 2 × 1) (2)

1.3
- The ionisation energy of one atom is relatively low
- The electron affinity of the other atom is high
- The lattice energy is high (3)

1.4 1.4.1 metallic bonding

1.4.2 dative covalent bonding/co-ordinate covalent bonding

1.4.3 ionic bonding

1.4.4 electrovalent bonding

1.4.5 ionic/hydrogen bonding

(5 × 1) (5)

1.5 The arrangement in space✓ of the covalent bond in multiple covalent✓ which is related to the number of electrons in their valency shell.✓ (3)

1.6 Sublimation energy : $Na_{(s)} \rightarrow Na_{(g)}$✓✓

First ionisation energy : $Na_{(g)} \rightarrow Na^+_{(g)} + e$✓✓ (4)

[25]

QUESTION 2

2.1 2.1.1 AX_5 (2)

2.1.2 chlorine triflouride (2)

2.1.3  (4)

2.1.4 trigonal pyramid (1)

2.1.5 five (1)

2.1.6 No,✓ because sulphur is surrounded by 10 valence electrons.✓ (2)

2.1.7 10 valence electrons (1)

2.2 2.2.1 chlorine ion (1)

2.2.2 covalent hydride (1)

2.2.3 Because it releases hydrogen ions in water. (2)

2.2.4 $K_a = \frac{[H_3O^+][Cl^-]}{[HCl]}$ ✓✓✓ (3)

2.2.5 Big, HCl is a strong acid. (2)

2.2.6
- H_2O and H_3O^+✓
- HCl and Cl^-✓ (2)

2.2.7 HCl (1)

[25]

QUESTION 3

3.1 $2H_2O_2$ ✓ → $2H_2O$✓ + O_2✓ (3)

3.2
- It is a colourless and diatomic gas
- It liquefies at – 183 °C and -219 °C
- It important in normal respiration and combustion process
- It reacts with all other elements except noble gases (Any 2 × 1) (2)

3.3 When a slow dry stream of oxygen is passed through a silent electrical discharge. (2)

3.4 3.4.1
- sulphur trioxide
- dinitrogen pentoxide
- carbon dioxide
- silicon dioxide (Any ONE)

3.4.2
- nitrous oxide
- nitric oxide (Any ONE)

3.4.3
- aluminium oxide
- zinc oxide
- water (Any ONE)

3.4.4
- potassium monoxide
- sodium monoxide
- calcium oxide (Any ONE)

(4 × 1) (4)

3.5 $Ca(OH)_2$✓ + $2NH_4Cl$ ✓ ⟶ $CaCl_2$✓ + $2H_2O$✓ + $2NH_3$✓ (5)

3.6
- colourless gas
- odourless diatomic gas (2)

3.7
- Addition of washing soda (sodium carbonate)
- The ion exchange process
- The calgon process (3)

3.8 N_2✓ + $3H_2$✓ → $2NH_3$✓
Haber process✓ (4)

[25]

QUESTION 4

4.1 CS_2✓ + $3Cl_3$✓ → CCl_4✓ + S_2Cl_2✓ (4)

4.2
- protium
- deuterium
- tritium (3)

4.3 C✓ + $2F_2$✓ → CF_4✓
product : carbon tetraflouride✓ (4)

4.4 4.4.1 ionic carbide
4.4.2 intrestitional carbide
4.4.3 interstitional hydride
4.4.4 covalent carbide
(4 × 1) (4)

4.5
- berrylium hydride
- magnesium hydride (2)

4.6 4.6.1 deuterium oxide
4.6.2 ethanol
4.6.3 carbon monoxide
(3 × 1) (3)

4.7 4.7.1 $C + 2H_2SO_4 \rightarrow 2H_2O$✓ + $2SO_2$✓ + CO_2✓ (3)

4.7.2 $NiO + CO \rightarrow Ni$✓ + CO_2✓ (2)
[25]

TOTAL: 100

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