Bergvliet High School

GRADE 11

Physical Science

Physics P2

25 November 2024

Memo

MARKS: 150

TIME: 3 hours

EXAMINER: K. Stuck

MODERATOR/S: Z. Booysen/ S. van Harte

This question paper consists of 11 pages and 2 data sheets.

Detach this sheet and attach it to the front of your answer sheets.

Name: _____ Teacher: Bo / Vh / Su

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Question 1	Marker	**20**	Moderator	**Question 6**	Marker	**22**	Moderator
Question 2	Marker	**20**	Moderator	**Question 7**	Marker	**13**	Moderator
Question 3	Marker	**22**	Moderator	**Question 8**	Marker	**15**	Moderator
Question 4	Marker	**15**	Moderator	**Total**	Marker	**150**	Moderator
Question 5	Marker	**23**	Moderator	**Percentage**	Marker	**100**	Moderator
Signature	Marker			**Signature**	Moderator		

Question 1

1.1	D ✓✓	(2)
1.2	D ✓✓	(2)
1.3	C✓✓	(2)
1.4	B✓✓	(2)
1.5	B✓✓	(2)
1.6	D✓✓	(2)
1.7	A✓✓	(2)
1.8	C✓✓	(2)
1.9	B✓✓	(2)
1.10	D✓✓	(2)

[20]

Question 2

2.1 A measure of the tendency of an atom in a molecule to attract bonding electrons. ✓✓ (2)

2.2 2.2.1 G✓ (1)

2.2.2 C ✓ and H✓ (2)

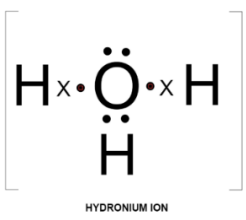
2.2.3 B✓ and E✓ (2)

2.2.4 B✓ (1)

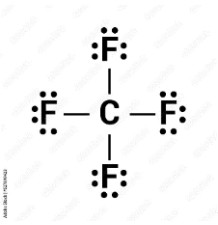
2.2.5 A✓ (1)

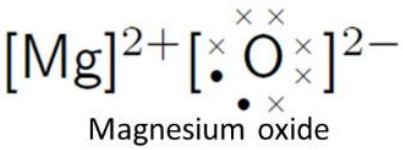
2.2.6 D✓ (1)

2.3 2.3.1 Dative covalent bond ✓ (1)

2.3.2 

✓✓ (2)

2.4 2.4.1 
✓✓

2.4.2 

✓✓ (2)

2.5 2.5.1 London forces ✓ (1)

2.5.2 Ion dipole forces ✓ (1)

2.5.3 Ion induced dipole forces✓ (1)

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Question 3

3.1 The energy needed to break one mole of its molecules into separate atoms ✓✓ (2)

3.2 Released ✓ (1)

3.3 0.074 nm✓ (1)

3.4 -436 $kJ.mol^{-1}$✓ (1)

3.5 3.5.1 B✓ (1)

3.5.2 C✓ (1)

3.6 Increase ✓ bond length decreases therefore bond energy will increase✓ (2)

3.7 3.7.1 The temperature at which the solid and liquid phases of a substance are at equilibrium. ✓✓ (2)

3.7.2 Solid✓ (1)

3.7.3 1 + 80 = 81 $g.mol^{-1}$ ✓✓ (2)

3.7.4 Dipole-dipole forces ✓ (1)

3.7.5 Molecular mass increases ✓ therefore intermolecular force strength increases ✓ therefore more energy is required to overcome the forces✓ resulting in higher boiling points (3)

3.7.6 Hydrogen fluoride has hydrogen bonding between its molecules ✓ this is stronger than dipole dipole forces ✓ therefore requires more energy to overcome the forces✓ resulting in a higher boiling point despite its smaller molecular mass. (3)

3.7.7 Hydrogen chloride ✓ it has the lowest boiling point ✓ (2)

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Question 4

4.1 The minimum energy needed for a reaction to take place✓✓ (2)

4.2 Experiment II✓ The energy of the products is more than the reactants/ ΔH is positive ✓ therefore energy was absorbed from the environment ✓ (3)

4.3 4.3.1 1139 + 75 = 1214 kJ/mol ✓✓ (2)

4.3.2 $\Delta H = H_p - H_R$ ✓

= 1041 – 1139✓

= - 98 kJ/mol✓ (3)

4.3.3 1041 kJ/mol

4.4 On graph:

Indicated:

- Energy of reactants and products ✓
- Activation energy (E_a) ✓
- Heat of reaction (ΔH) ✓
- Correct shape for exothermic✓

(4)

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Question 5

5.1 5.1.1 The limiting reagent is the reactant that is used up first. ✓✓ (2)

5.1.2 $n(KCl) = cV$✓
$= 0,25\ (0,055)$ ✓
$= 0,0138$ mol
$n(AgNO_3) = cV$
$= 0,15(0,07)$ ✓
$= 0,0105$ mol
$KCl : AgNO_3$
1 : 1 ✓
0,0138 : 0,0105
$AgNO_3$ is the limiting reagent ✓ (5)

5.1.3 $n(AgCl) = n(AgNO_3) = 0,0105$ mol ✓

$m = nM$ ✓
$= 0,0105(143,5)$ ✓
$= 1,51$ g ✓ (4)

5.1.4 $KCl : AgNO_3$
1 : 1 ✓
Therefore n(KCl used) = 0,0105 mol
n(KCl excess) = 0.0138 - 0,0105 ✓
= 0.0033 mol
m(KCl excess) = n X M✓
=0.0033 X 74,5✓
= 0.25 g✓ (5)

5.2 Theoretical yield = $\frac{Actual\ yeild}{Theoretical\ yield} \times 100$✓

$0,80 = \frac{30}{Theoretical\ yeild}$✓

Theoretical yield = 37,5 g

$n_{(MgO)} = m/M$✓
= 37,5/(24+16) ✓
= 0,9375 mol

$n_{(MgO)} : n_{(Mg)}$
2:2
Therefore $n_{(Mg)} = 0.9375$ mol ✓

$m_{(Mg)} = nM$
= 0,9375 X 24 ✓
= 22,5 g ✓ (7)

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Question 6

6.1 6.1.1 Substances that do not completely dissociate into their constituent ions when dissolved in water.✓✓ (2)

6.1.2 $$2HCl + Ca(OH)_2 \rightarrow CaCl_2 + 2H_2O$$

Salt ✓

water✓

balanced✓ (3)

6.1.3 $\frac{c_a v_a}{c_b v_b} = \frac{n_a}{n_b}$ ✓

$\frac{c_a(40)}{(0,3)(25)}$ ✓ $= \frac{2}{1}$ ✓

$c_a = 0{,}375\ mol.dm^{-3}$ ✓ (4)

6.1.4 B✓ (1)

6.1.5 Methyl orange ✓ (1)

6.2 6.2.1 A proton donor ✓ (1)

6.2.2 HSO_4^- ✓ & SO_4^{2-} ✓
H_2O ✓ & H_30^+ ✓ (4)

6.2.3 $HSO_4^- \rightarrow SO_4^{2-} + H^+$ ✓✓ (2)

6.2.4 HSO_4^- ✓/ hydrogen sulphate ion
H_2O ✓/ water (2)

6.2.5 Monoprotic✓, can donate one proton✓ (2)

[22]

Question 7

7.1 Substance loses electrons ✓and oxidation number increases ✓ (2)

7.2 $Cu \rightarrow Cu^{2+} + 2e^{-}$ ✓✓ (2)

7.3 Ag^{+}✓ (1)

7.4 NO_3^{-} / Nitrate ion ✓, its oxidation number stays the same/ it does not lose or gain electrons ✓ (2)

7.5 $Cu + 2\ Ag^{+} \rightarrow Cu^{2+} + 2\ Ag$

✓ Reactants

✓Products

✓Balanced (3)

7.6 7.6.1 0 ✓ (1)

7.6.2 2+✓✓ (2)

[13]

Question 8

8.1 Unsaturated✓, it contains a double bond/ Not made up of single bonds only✓ (2)

8.2 A✓ (1)

8.3 Formyl group✓ (1)

8.4 8.4.1 2-methylbut-2-ene✓✓ (2)

8.4.2 2,5-dichloro✓- 3- methyl✓hexane ✓ (3)

8.4.3 But-2-one✓✓ (2)

8.5 Primary alcohol✓ the carbon to which the hydroxyl group is attached to is only bonded to one carbon atom. ✓ (2)

8.6 Butyl✓ butanoate ✓ (2)

[15]