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KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

# NATIONAL SENIOR CERTIFICATE

## GRADE 11

## PHYSICAL SCIENCES P2

## MARKING GUIDELINES

## COMMON TEST

## JUNE 2024

**This marking guideline consist of 5 pages.**

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## QUESTION ONE

1.1 C ✓✓ (2)

1.2 B ✓✓ (2)

1.3 A ✓✓ (2)

1.4 D ✓✓ (2)

1.5 D ✓✓ (2)

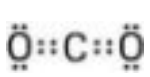
**[10]**

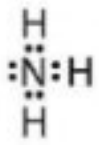
## QUESTION TWO

2.1.1 The bond formed when two atome share electrons (when orbitals overlap). ✓ (1)

2.1.2 A group of two or more atoms that are covalently bonded and that function as a unit. ✓ (1)

2.1.3 A pair of electrons in the valence shell of an atom that is not shared with another atom. ✓✓ (2)

2.2.1  ✓✓ (2)

2.2.2  ✓✓ (2)

2.3.1 one✓ (1)

2.3.2 three✓ (1)

2.4.1 Covalent ✓ (1)

2.4.2 Covalent.✓ (1)

2.5 $H_2O$ ✓ and $NH_3$ ✓ (2)

2.6 Hydronium ion✓ - $H_3O^+$ ✓
Ammonium ion✓ - $NH_4^+$ ✓ (4)

2.7 Five ✓ (1)

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2.8.1 A measure of the tendancy of an atom in a molecule to attract bonding electrons / shared pairs of electrons. ✓✓ (2)

2.8.2 $\Delta EN_{C-O}$ = 3,5 – 2,5 ✓
= 1,0 ✓ (2)

2.8.3 CO is linear with O being more electronegative, ✓ therefore forming a slightly negative end / The charge distribution in CO is asymmetrical. ✓ thus is a polar molecule.
$CO_2$ molecule is also linear with a central C atom✓ so that the O atoms on either side have the same polarity /The charge distribution is symmetrical ✓ thus is a non-polar molecule. (4)

**[27]**

**QUESTION 3**

3.1 Is the number of bonds (single,double or triple) that exist between two atoms.✓✓ (2)

3.2 2✓ (1)

3.3.1 As bond order increases, bond length decreases. ✓ (1)

3.3.2 As bond length increases bond energy decreases. ✓ (1)

3.4 Amount of energy = 1 x 839✓ + 2 x 437 ✓
= 1713 $kJ.mol^{-1}$ ✓ (3)

**[8]**

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**QUESTION 4**

4.1.1 Forces of attraction between molecules. ✓✓ (2)

4.1.2 The temperature at which the solid and liquid phases of a substance are in equilibrium✓✓ (NOTE: The word temperature must be mentioned) (2)

4.1.3 Hydrogen halides✓ (1)

4.1.4 Dipole-dipole forces ✓ (No marks for *Van Der Waal Forces*) (1)

4.1.5
a) HCℓ has dipole-dipole forces (which are weak). ✓
HF (has weak dipole-dipole forces but also) has strong Hydrogen bonds. ✓
Since intermolecular forces are stronger between molecules of HF✓, more energy is needed to overcome the intermolecular forces between HF molecules.✓
Thus HF will have a higher melting point that HCℓ. (4)

4.1.5
b) HCℓ and HI both have (weak) dipole-dipole forces, ✓ however HI has a greater molecular mass/size (than HCl), ✓ hence stronger intermolecular forces. ✓
Thus more energy is needed to overcome the intermolecular forces/ dipole-dipole forces between molecules of HI (than HCℓ). ✓
Thus HI will have a higher melting point. (4)

4.1.6 Hydrogen iodide✓ (Do not accept HI) (1)

4.2.1 The temperature at which the vapour pressure of a liquid equals atmospheric pressure. ✓✓(NOTE: The word temperature must be mentioned) (2)

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4.2.2 **MARKING CRITERIA:**

Compare boiling points of $CH_4$ and $CH_3OH$:

- Identify type of IMFs in $CH_4$ and $CH_3OH$.✓
- Compare strength of IMF in $CH_4$ and $CH_3OH$✓
- Refer to the energy required

Compare boiling points of $H_2O$ and $CH_3OH$:

- Compare number of sites for hydrogen bonding for molecules of $H_2O$ and molecules of $CH_3OH$. ✓
- Compare strength of Hydrogen bonding in molecules of $H_2O$ and $CH_3OH$✓
- Refer to the energy required

Any one✓

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Methane/$CH_4$- has weak London forces/dispersion forces between molecules while methanol/$CH_3OH$ has (weak London forces and) strong hydrogen bonds. ✓
Therefore, intermolecular forces are stronger between molecules of methanol /$CH_3OH$✓(than between molecules of methane/$CH_4$).
More energy needed to overcome intermolecular forces between molecules of methanol/$CH_3OH$✓ (than between molecules of methane/$CH_4$).
Thus methanol has a higher boiling point than methane.

Molecules of water/$H_2O$ have more (two/four/multiple) sites for hydrogen bonding than molecules of $CH_3OH$.✓
Thus, molecules of water have stronger / the strongest intermolecular forces, ✓ thus the highest boiling point. (5)

4.2.3 Methane. ✓ It has the lowest boiling point. ✓ (2)

**[24]**

**QUESTION 5**

5.1 The property of a solid, liquid or gaseous chemical substance(solute) to dissolve in a solid, liquid or gaseous solvent to form a homogenous solution. ✓✓ (2)

5.2 Bonds between iodine molecules and carbon tetrachloride molecules are weak London forces. ✓ These intermolecular forces are of comparable strength / Non-polar solute will dissolve in a non-polar solvent.✓

Between water molecules are hydrogen bonds✓ that are much stronger than London forces✓

(4)

(NB: "Like dissolves like" is NOT an explanation. Hence NO marks awarded)

**[6]**

**TOTAL MARKS: 75**

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