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NATIONAL SENIOR CERTIFICATE

GRADE/*GRAAD* 11

PHYSICAL SCIENCES: CHEMISTRY (P2) / *FISIESE WETENSKAPPE: CHEMIE (V2)*

FINAL ERRATA MARKING GUIDELINE/FINALE ERRATA *NASIENRIGLYNE*

JUNE 2025/*JUNIE 2025*

MARKS/*PUNTE*: 100

This marking guideline consists of 8 pages including this cover page/*Hierdie nasienriglyne bestaan uit 8 bladsye, insluitend hierdie voorblad.*

QUESTION 1/*VRAAG* 1

1.1 **D** ✓✓

1.2 **A** ✓✓ **or/*of* D**

1.3 **B** ✓✓

1.4 **A** ✓✓

1.5 **B** ✓✓

1.6 **A** ✓✓

1.7 **D** ✓✓

1.8 **C** ✓✓ **or/*of* D**

1.9 **D** ✓✓

1.10 **B** ✓✓

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[20]

QUESTION 2/*VRAAG* 2

2.1 Covalent bond is the sharing of electrons between two atoms to form a molecule. ✓✓ *Kovalente binding is die deling van elektrone tussen twee atome om 'n molekule te vorm* *(2 or 0)* (2)

2.2.1 Lone pair is a pair of electrons in the valence shell of an atom that is not shared with another atom. ✓✓/ *'n Alleenpaar is 'n paar elektrone in die valensskil/orbitaal van 'n atoom wat nie met 'n ander atoom gedeel word nie.* (2)

2.2.2  ✓✓ (2)

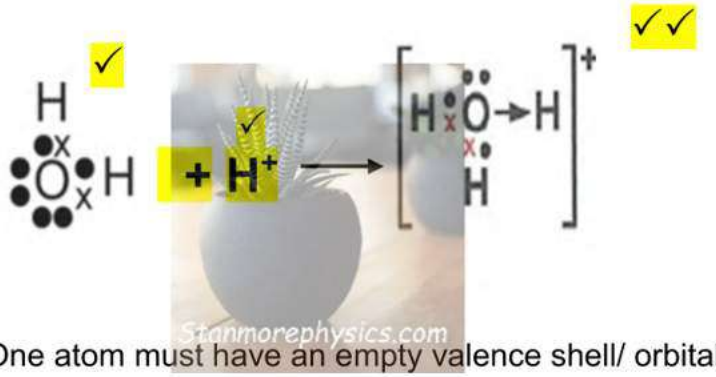
2.2.3 Oxygen. ✓✓/O/*suurstof* (NOT O_2/*NIE* O_2 *NIE*) (2)

2.2.4 Two (2) lone pairs. ✓✓/*Twee (2) alleenpare* (2)

2.2.5 Angular molecular shape. ✓✓/bent /*Hoekige molekulêre vorm/gebuig* (2)

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2.3.1 H_2O has two lone pairs of electrons. One of these lone pairs can be used to fill the empty outermost energy level of the H^+ ion. ✓ This now forms a dative covalent bond between H^2O and H^+ producing the H_3O^+ ion. ✓/*H_2O het twee alleenpaar elektrone. Een van hierdie alleenpare kan gebruik word om die leë buitenste energievlak van H^+ ione te vul. Hierdie vorm nou 'n datiewe kovalente binding tussen H_20 en H^+, wat H_3O^+ ione produseer.*



(6)

2.3.2 One atom must have an empty valence shell/ orbital. ✓✓/ *Een atoom moet 'n leë valensskil/orbitaal hê.*

The other atom must have a lone pair of electrons. ✓✓/ *Die ander atoom moet 'n alleenpaar elektrone hê.* (4)

[22]

QUESTION 3/*VRAAG 3*

3.1 The measure of the amount of attraction✓ an atom has on a shared pair of electrons. ✓/ *Die maatstaf van die hoeveelheid aantrekkingskrag wat 'n atoom op 'n gedeelde elektronpaar het.* (2)

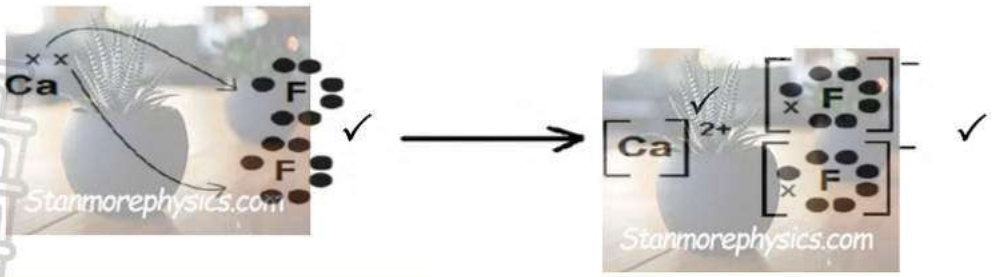
3.2 HF: Electronegativity difference =1,9✓/ *Elektronegatiwiteitsverskil =1,9*

CaF: Electronegativity difference = 3,0✓/*Elektronegatiwiteitsverskil = 3,0*

HF will be expected to be covalent✓ although it does have some ionic character due to the relatively large electronegativity difference. CaF_2 will be strongly ionic✓ due to a very high electronegativity./ *Daar sal verwag word dat HF kovalent sal wees, alhoewel dit wel 'n mate van ioniese eienskappe het as gevolg van die relatief groot elektronegatiwiteitsverskil. CaF_2 sal sterk ionies wees as gevolg van 'n baie hoë elektronegatiwiteit.* (4)

Marking guidelines/*Nasienriglyne*

3.3



Marking Criteria/*Nasien kriteria*

	Marks/*punte*
xx **Ca**	✓ (Ca with two electrons/*Ca met 2 elektrone)*
.. .. : F. . F: " "	✓ (Each F with seven electrons/*elke F met sewe elektrone)*
[Ca]$^{2+}$	✓ (Ca with 2+/*Ca met 2+)*
.. .. [: F .^{x}]$^{-}$ [.^{x} F:]$^{-}$ " "	✓ (Each F bonded to Ca electron/*Elke F aan 'n Ca elektron gebind)*

OR/*OF*

$\overset{x\,x}{Ca} \rightarrow Ca^{2+} + 2e^-$

$2\ F + 2e^- \rightarrow 2\ [F]^- \rightarrow Ca^{2+}\ 2\ [F]$

(4)

3.4

HF has two distinct regions of charge on the molecule ✓✓

/HF het twee afsonderlike ladingsgebiede op die molekule.

(2)

3.5 The H atom in the molecule must be bonded to a small atom✓ of very high electronegativity✓/ *Die H-atoom in die molekule moet gebind wees aan 'n klein atoom met baie hoë elektronegatiwiteit.* (2)

[14]

QUESTION 4/*VRAAG 4*

4.1 Bond length is the average distance between the nuclei of two bonded atoms. ✓✓/ *Bindingslengte is die gemiddelde afstand tussen die kerne van twee gebonde atome* **(2 or/of 0)** (2)

4.2.1 120 pm ✓✓ (2)

4.2.2 (+ or -) 800 kJ mol^{-1} ✓✓ Accept range/*aanvaar reeks*: 790 – 800 (2)

4.2.3 Bond energy/ *Bindingsenergie* **(2 or/of 0)** (2)

4.3 LONGER THAN ✓ The sulphur atom is larger than the carbon atom ✓ therefore the bond length will be longer (the attraction between the two atoms will be less) / *LANGER AS. Die swaelatoom is groter as die koolstofatoom daarom sal die bindingslengte langer wees (die aantrekkingskrag tussen die twee atome sal minder wees)* (2)

4.4 At point D there is very little/weak (or no) force✓✓/ *By punt D is daar baie min/swak (of geen) krag.* (2)

4.5.1 The shorter the bond length the higher the bond energy. ✓✓/ *Hoe korter die bindingslengte, hoe hoër die bindingsenergie*

OR/OF

The longer the bond length the lower/less/smaller the bond energy.✓✓/ *Hoe langer die bindingslengte, hoe laer/minder/kleiner die bindingsenergie* (2)

4.5.2 A ✓.Need less energy✓ to overcome the single bond and there for weaker forces✓ /*A. Benodig minder energie om die enkelbinding te breek, daarom swakker kragte*.

OR/*OF*

A✓. Shorter bond length therefore less energy✓ to overcome the single bond and weaker force✓/*A. Korter bindingslengte, daarom minder energie omdie enkelbinding te breek en dus swakker kragte.*

(3)

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QUESTION 5/*VRAAG 5*

5.1 The boiling point is the temperature at which the vapour pressure of a liquid is equal to the atmospheric pressure. ✓✓/ *Die kookpunt is die temperatuur waarby die dampdruk van 'n vloeistof gelyk is aan die atmosferiese druk*

(2 or 0) (2)

5.2.1 NH_3 has HYDROGEN BONDS between molecules and CH_4 LONDON FORCES between molecules✓/*NH_3 het waterstofbindings tussen molekules en CH_4 het Londonkragte tussen molekules*

Hydrogen bonds between molecules in NH_3 is stronger than the London forces in CH_4 ✓/*Waterstofbindings tussen molekules in NH_3 is sterker as Londonkragte in CH_4.*

More energy needed to overcome the stronger forces between NH_3 molecules therefore higher boiling point✓/*Meer energie is nodig om die sterker kragte in NH_3 te oorkom as die Londonkragte in CH_4.*

OR/*OF*

CH_4 London forces between molecules and Hydrogen bonds between NH_3 molecules. ✓/*CH_4 het Londonkragte tussen molekules en NH_3 het waterstofbindings tussen molekules*

London forces between CH_4 molecules weaker than hydrogen bonds between NH_3. ✓/*London kragte tussen CH_4 molekules is swakker as waterstofbindings tussn NH_3.*

Less energy needed to overcome weaker forces between CH_4 molecules and therefore lower boiling point. ✓/*Minder energie is nodig om die swakker kragte tussen CH_4 molekules to oorkom en daarom het dit 'n laer kookpunt.*

(3)

5.2.2 The intermolecular dispersion forces in SiH_4 bigger than CH_4 ✓, SiH_4 requires larger energy ✓ to break these dispersion forces before the molecules can convert to vapor. ✓/ *Die intermolekulêre dispersiekragte in SiH_4 is groter as CH_4 , SiH_4 benodig groter energie om hierdie dispersiekragte te breek voordat die molekules na damp kan omskakel.*

OR/OF

Molecular mass/size of SiH_4 is greater than CH_4✓. London forces in SiH_4 is stronger than in CH_4. More energy is needed to overcome the intermolecular forces. Therefore the higher boiling point (Accept the inverse as well)/*Molekulêre massa/grootte van SiH_4 is groter as die van CH_4.*

Londonkragte in SiH_4 is sterker as in CH_4. Meer energie is nodig om die intermolekulêre kragte te oorkom, vandaar die hoër kookpunt. (Aanvaar die omgekeerde stelling ook). (3)

5.3 NH_3 and H_2O both have polar molecules with hydrogen bonds between them.✓ The electronegativity between N and H is 3,0 – 2,1 = 0,9 whereas the electronegativity difference between H and O is 3,5 – 2,1 = 1,4. ✓ The covelent bonds inside the water molecule are more polar than those in the NH_3 molecule. ✓ Water molecules have an angular shape, whereas NH_3 molecules are trigonal pyramidal. ✓ This allows each water molecules to form two hydrogen bonds with two other water molecules making the intermolecular forces in water. / *NH_3 en H_2O het albei polêre molekules met waterstofbindings tussen hulle. Die elektronegatiwiteit tussen N en H is 3,0 – 2,1 = 0,9, terwyl die elektronegatiwiteitsverskil tussen H en O 3,5 – 2,1 = 1,4 is. Die kovalente bindings binne die watermolekule is meer polêr as dié in die NH_3-molekule. Watermolekules het 'n hoekige vorm, terwyl NH_3-molekules trigonaal-piramidaal is. Dit laat elke watermolekule toe om twee waterstofbindings met twee ander watermolekules te vorm, wat die intermolekulêre kragte in water veroorsaak.* (4)

5.4.1 CH_4 ✓ and/*en* SiH_4 ✓ (2)

5.4.2 NH_3 ✓ and/*en* H_2O✓ (2)

5.5.1 A bond that exists within a molecule between the atoms in that molecule✓✓**Accept**: Forces between atoms/ *'n Binding wat binne 'n molekule tussen die atome in daardie molekule bestaan. Aanvaar: Kragte tussen atome* ***(2 or/of 0)*** (2)

5.5.2 Polar✓ covalent bond✓ (It will be polar due to the electronegativity difference between H and O) / *Polêr kovalente binding (Dit sal polêr wees as gevolg van die elektronegatiwiteitsverskil tussen H en O)* (2)

5.5.3 This is the force of attraction between molecules in a system✓✓/ *Dit is die aantrekkingskrag tussen molekules in 'n stelsel.* ***(2 or 0)*** (2)

5.5.4 Hydrogen bonding (intermolecular force). ✓✓/ *Waterstofbinding (intermolekulêre krag)* (2)

5.5.5 O is a very small atom in terms of its atomic size. ✓/ *O is 'n baie klein atoom in terme van sy atoomgrootte*

O has a very high electronegativity. ✓/ *O het 'n baie hoë electronegativities* (2)

5.5.6 δ^+✓/slightly positive/*ietwat positief*

(H will not have any electron near its nucleus as the high electronegativity of O will pull the shared electron pair away from the H atoms and towards itself, leaving the H atoms δ^+)/(*H sal geen elektron naby sy kern hê nie, aangesien die hoë elektronegatiwiteit van O die gedeelde elektronpaar weg van die H-atome en na homself sal trek, wat die H-atome δ^+) sal laat.)*

(1)

[27]

TOTAL/*TOTAAL:* 100

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