1.6 D ✓✓ (2)

QUESTION 5/*VRAAG 5*

5.1 A change in which no new substances are formed. ✓✓/*'n Verandering waarin geen nuwe stowwe gevorm word nie.*

OR/*OF*

A change in which energy changes are small in relation to chemical changes. ✓✓/*'n Verandering waarin energieveranderinge klein is in vergelyking met chemiese veranderinge.*

OR/*OF*

A change in which mass, number of atoms and molecules are being conserved. ✓✓/*'n Verandering waarin massa, getal atome en molekule behoue bly.* (2)

5.2.1 X ✓ (1)

5.2.2 Y ✓ (1)

5.3 Sublimation. ✓/*Sublimasie* (1)

5.4 Colour change. ✓/*Kleurverandering*

Formation of gas ✓/*Vorming van gas*

Formation of a precipitate ✓/*Vorming van 'n neerslag*

Change in temperature ✓/*Verandering in temperatuur* (Any two/*Enige twee*) (2)

5.5.1 Heat. ✓/*Hitte* (1)

5.5.2 $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$ (4)

Notes/Aantekeninge
- Reactants✓; products✓; phases✓; balancing✓
  Reaktanse/produkte/fases/balansering

Marking rule 6.3.10./*Nasienreël 6.3.10.*

5.6.1 States that, no matter how a chemical compound is prepared, it always contains the same elements in the same proportion by mass. ✓✓/*Stel dit dat dit nie saak maak hoe 'n chemiese binding berei word nie; dit bevat altyd dieselfde elemente in dieselfde verhouding by massa.* (2)

5.6.2 ***OPTION 1/ OPSIE 1:***

Mass of CO_2 in the 1st sample/*Massa van CO_2 in die 1ste monster*
= 20 – 11,2✓
= 8,8 g

Proportion of CO_2 in the 1st sample/*Verhouding van CO_2 in die 1ste monster*
= $\frac{8,8}{20}$ ✓

∴ Mass of CO_2 in the 2nd sample/*Massa van CO_2 in die 2de monster*
= $\frac{8,8}{20}$ x 30 ✓

= 13,2 g✓

(4)

OPTION 2/ OPSIE 2:	***OPTION 3/ OPSIE 3:***
100 g $CaCO_3$ → 44 g CO_2 ✓ 30 g $CaCO_3$ → x g CO_2 ✓ x = $\frac{30 \times 44}{100}$ ✓ x = 13,2 g✓	20 g $CaCO_3$ → 11,2 g CaO ✓ 30 g $CaCO_3$ → x g CaO ✓ x = 16, 83 g CaO ∴ Mass of CO_2 in the 2nd sample/ *Massa van CO_2 in die 2de monster* = 30 – 16, 83 = 13,2 g✓

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QUESTION 5/*VRAAG 5*

5.1 An aqueous solution. ✓/A solution in water ✓/*'n Waterige oplossing.*✓ (1)

5.2 Redox. ✓ Electron transfer took place. ✓/
Redoks. ✓ *Elektron oordrag het plaasgevind.* ✓

Accept/*Aanvaar*: Change in oxidation number/ *Verandering in oksidasiegetal.* (2)

5.3 Chemical change. ✓/*Chemiese verandering.* ✓ (1)

5.4 The amount of substance having the same number of particles as there are atoms in 12g C-12.✓✓
Die stofhoeveelheid wat dieselfde getal deeltjies het as wat daar atome in 12g koolstof-12 is. ✓✓ (2)

5.5 $H_2O_2 : O_2$

$2 : 1$

$\therefore n(O_2) = 2 \text{ mol}$ ✓

$n = \frac{V}{V_m}$ ✓

$2 = \frac{V}{22,4}$ ✓

$V = 44,8 dm^3$ ✓ (4)

5.6 $n(H_2O_2) = \frac{m}{M}$

$= \frac{17}{34}$ ✓

$= 0,5 \text{ mol}$

$n = \frac{N}{N_A}$ ✓

$(0,5)(2) = \frac{N}{6,02 \times 10^{23}}$ ✓

$N = 6,02 \times 10^{23}$ atoms/*atome* ✓ (4)

[14]

NOTE/*NOTA*:
If molar mass of H_2O_2 is incorrect, mark positively. Max 2/4
Positiewe nasien indien molêre massa van H_2O_2 verkeerd is. Maksimum punte 2/4

1.8 B ✓✓ (2)

QUESTION 6/*VRAAG 6*

6.1 6.1.1 Reaction (ii) ✓/*Reaksie (ii)* (1)
6.1.2 Reaction (i) ✓/*Reaksie (i)* (1)

6.2 Gas phase ✓
Gasfase (1)

6.3 6.3.1 aluminium carbonate: $A\ell_2(CO_3)_3$ ✓✓
aluminiumkarbonaat: $A\ell_2(CO_3)_3$ (2)

6.3.2 aluminium oxide: $A\ell_2O_3$ ✓✓
aluminiumoksied: $A\ell_2O_3$ (2)

6.4 $C\ell_{2\,(g)} + H_{2\,(g)} \rightarrow 2HC\ell_{(g)}$ ✓Reactants/ Reagense ✓ Products/ Produkte (2)

6.5 Reactants/*Reaktante*: M ($C\ell_2$) + M (H_2)
= (2)(35,5) + (2)(1)
= 73 g.mol^{-1} ✓

Products/Produkte: M (2 $HC\ell$)
= (2)(1 + 35,5)
= 73 g.mol^{-1} ✓

Thus the mass of the reactants = mass of the products ✓
Dus die massa van die reaktante = massa van die produkte. (3)

6.6 M($HC\ell$) = 1 + 35,5
= 36,5 (g.mol^{-1}) ✓

$$\%H = \frac{1}{36.5} \times 100$$
$$= 2{,}74\% \checkmark$$

$$\%C\ell = \frac{35{,}5}{36{,}5} \times 100$$
$$= 97{,}26\% \checkmark$$

(3)
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QUESTION 6/*VRAAG 6*

6.1

6.1.1 Metallic (bond)/*Metaal (binding)* ✓ (1)

6.1.2 Ionic (bond)/*Ioniese (binding)* ✓ (1)

6.2 Chemical change/*Chemiese verandering* ✓
A new substance is produced. ✓
'n Nuwe stof word gevorm. (2)

6.3 $2Mg + O_2$ ✓→ $2MgO$ ✓ Bal. ✓

Notes/*Aantekeninge*
- Reactants ✓ Products ✓ Balancing ✓
  Reaktanse ✓ *Produkte* ✓ *Balansering* ✓
- Ignore/*Ignoreer* ⇌
- Marking rule 3.10/*Nasienreël 3.10*

(3)

6.4 $2Mg + O_2 \rightarrow 2MgO$
$2(24)$ ✓ $+ 2(16)$ ✓ $= 2(16 + 24)$ ✓
$80 = 80$ ✓

Marking criteria/*Nasienriglyne:*
- M(reactant 1) correctly calculated. ✓
  M(reaktans 1) korrek bereken.
- M(reactant 2) correctly calculated. ✓
  M(reaktans 2) korrek bereken.
- M(product) correctly calculated. ✓
  M(produk) korrek bereken.
- M(reactants) = M(product) ✓
  M(reaktanse) = M(produkte)

(4)
[11]

Science Clinic Memo 1

7.1.

	Volume	Shape	Spaces between particles	Forces between particles	Arrangement of particles	Movement of particles
Gas	Depends on container	Depends on container	Far apart	SMALL	FAR APART	VERY FAST
Liquid	FIXED	Depends on container	TOUCHING	MEDIUM	Touching each other but not in fixed positions	Slide past each other switching places.
Solid	Fixed	FIXED	TOUCHING	LARGE	Close together. Fixed positions in a set pattern.	Vibrate in fixed position

7.2. A chemical reaction takes place. Sodium and chlorine react to form a new substance Table salt which has different properties.

7.3.

7.3.1. Chemical

7.3.2. The 1,0g magnesium reacted with 0,8g oxygen in the air to form 1,8g MgO.

7.4.

7.4.1.

7.4.2. Molar mass ratio.

7.4.3. The ratio between the numbers of O and N atoms in the molecule.

7.4.4. $N_2 + O_2 \rightarrow 2\,NO$

$2N_2 + 5O_2 \rightarrow 2\,N_2O_5$

Science Clinic Memo 2

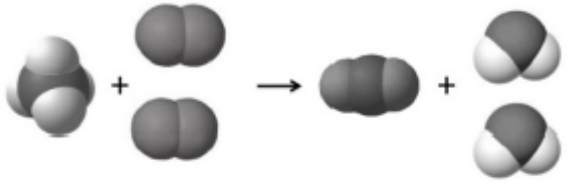
7.4.5. N_2O_5 has more energy stored because more bonds were formed when the reaction took place.

7.5.

7.5.1. $CH_4 + 2O_2 \rightarrow + 2H_20$

7.5.2. Chemical

7.5.3.



7.5.4. 2

7.5.5.

	Reactants before	→	Products after
Word equation	Methane (CH_4) reacts with oxygen		Water and carbon dioxide
Chemical equation	$CH_4 + 2O_2$		$CO_2 + 2H_20$
Atoms	C = 1 H = 4 O = 4		C = 1 H =4 O = 4
Mass of all atoms	(1 x 12) + (4 x 1) + (4 x16) = 80		(1 x 12) + (4 x 1) + (4 x16) = 80

7.6.

7.6.1. A reaction that releases heat into the environment.

7.6.2.

7.6.2.1. Exothermic

7.6.2.2. Exothermic

7.6.2.3. Endothermic

7.7.

7.7.1. $4Na + O_2 \rightarrow 2Na_2O$

7.7.2. $2NaNO_3 \rightarrow 2NaNO_2 + O_2$

7.7.3. $2HI \rightarrow H_2 + I_2$

Science Clinic Memo 3

7.7.4. $C + O_2 \rightarrow CO_2$

7.7.5. $Cu + 2H_2SO_4 \rightarrow CuSO_4 + 2SO_2 + 2H_2O$

7.8.

7.8.1. A and D

7.8.2. B and C

7.9.

7.9.1.

7.9.1.1. Metallic bonding

7.9.1.2. Ionic bonding

7.9.2. A chemical change. There are new bonds formed between lithium and oxy

7.9.3. $4Li(s) + O_2(g) \rightarrow 2Li_2O(s)$

7.9.4.

Reactants:	Products:
4(7) + (32)	2(30)
=60	=60

Mass of reactants= mass of products

Therefore mass is conserved

7.9.5. Covalent bonding

7.9.6. $2Li(s) + 2H_2O\ (l) \rightarrow 2LiOH(aq) + H_2(g)$

7.10.

7.10.1. $Mg + 2HCl \rightarrow MgCl_2 + H_2$

7.10.2. $2BiCl_3 + 3H_2S \rightarrow Bi_2S_3 + 6HCl$

7.10.3. $2KClO_3 \rightarrow 2KCl + 3O_2$

7.10.4. $2AgNO_3 + MgCl_2 \rightarrow 2AgCl + Mg(NO_3)_2$

7.10.5. $2Al + 3CuSO_4 \rightarrow Al_2(SO_4)_3 + 3Cu$