

HILLCREST HIGH SCHOOL

PHYSICAL SCIENCE GRADE 10

NOVEMBER 2022

TIME : 2 HRS TOTAL : 100

TOTAL EXTENSION : 110

PAPER 2 – CHEMISTRY MEMO

SECTION A

QUESTION 1: MULTIPLE-CHOICE

(2 x 5 = 10)

- 1.1 B ✓ ✓
1.2 C ✓ ✓
1.3 D ✓ ✓
1.4 C ✓ ✓
15 C ✓ ✓

SECTION B

(90)

QUESTION 2 : ONE-WORD ANSWERS

(3)

- 2.1 mixture ✓ (1)
2.2 standard ✓ (1)
2.3 empirical ✓ (1)
2.4 homogeneous

QUESTION 3

3.1.1

3p

↑	↑	↑	↑
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 (18)

↓

3s

↑

 ✓

2p

↑	↑	↑
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 ✓

2s

↑

 ✓

1s

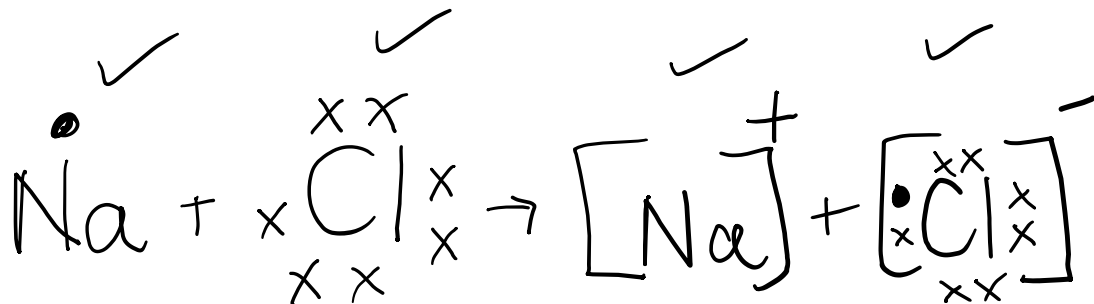
↑

3.1.2 halogen ✓ (3)

3.2.1 $1s^2 2s^2 2p^6 3s^1$ ✓ ✓ (1)

3.2.2 23 ✓ (1)

3.3



3.4 $2 \text{Na} + \text{Cl}_2 \rightarrow 2 \text{NaCl}$ ✓ ✓ (4)

3.5.1 table salt ✓ *don't just say salt – there are many different types of salts (1)

3.5.2 covalent ✓ (1)

3.5.3 Van Der Waals London ✓ (1)

3.5.4 ion-ion / Coulombic ✓ (1)

QUESTION 4 (6)

4.1.1 copper (II) chloride ✓ (1)

4.1.2 ammonium phosphate ✓ (1)

4.1.3 hydrogen ethanoate / ethanoic acid ✓ (1)

4.2.1 KMnO_4 ✓ (1)

4.2.2 $\text{Fe}_2(\text{CO}_3)_3$ ✓ (1)

4.2.3 $\text{Al}(\text{NO}_3)_3$ (1)

QUESTION 5 (6)

5.1 endothermic ✓ (1)

5.2 activation energy (1)

5.3 $700 - 200 = 500 \text{ kJ}\cdot\text{mol}^{-1}$ ✓ ✓ (2)

5.4 $400 - 200 = 200 \text{ kJ}\cdot\text{mol}^{-1}$ ✓ ✓ (2)

QUESTION 6 (4)

6.1 $(5/20 \times 100) = 25\%$ ✓ (1)

6.2 $\text{RAM} = \left(\frac{23}{1} \times \frac{25}{100}\right) + \left(\frac{25}{1} \times \frac{75}{100}\right)$ ✓
 $\text{RAM} = 24,5 \text{ u}$ ✓ (3)

QUESTION 7 (8)

7.1

Let 1% = 1g

$$n_{\text{C}} = \frac{m}{M} = \frac{54,5}{12} = 4,54 \text{ mol}$$

$$n_{\text{H}} = \frac{m}{M} = \frac{9,1}{1} = 9,1 \text{ mol}$$

$$n_{\text{O}} = \frac{m}{M} = \frac{36,4}{16} = 2,275 \text{ mol}$$

mole ratio C : H : O

✓ Show this step ↓ (-2,275) :)

$4,54 \quad 9,1 : 2,275$
 actual ratio $2 : 4 : 1$ ✓
 ∴ empirical formula = C_2H_4O ✓

(5)

7.2 $EM = (12 \times 2) + (1 \times 4) + (16 \times 1) = 44$ and $MM = 132,12$

ratio = $MM / EM = 132 / 44 = 3$ ✓

molecular formula = $3 \times EF = 3 \times C_2H_4O = C_6H_{12}O_3$

(3)

QUESTION 8

(4)

8.1 mass of $2X = 286 - (10 \times 18) - (12 + 48)$
 $= 106$
 of $2X = 46$
 Mass of $X = 23$ ✓

Therefore the element is sodium / Na ✓

(3)

QUESTION 9

(12)

Calculate :

9.1 M of $(C_{12}H_{22}O_{11}) = 144 \text{ g} \cdot \text{mol}^{-1}$ ✓

$\%C = \frac{144}{342} \times \frac{100}{1} = 42,11\%$ ✓

(3)

9.2 $n = \frac{m}{M} = \frac{9}{18} = 0,5 \text{ mol}$ ✓

$$V = n V_0 = 0,5 \times 22,4 = 11,2 \text{ dm}^3 \quad (4)$$

9.3

$$n = \frac{m}{M} = \frac{300}{120} = 2,5 \text{ mol}$$

$$N_0 = n N_A$$

$$N_0 = 2,5 \times 6,02 \times 10^{23}$$

$$N_0 = 1,505 \times 10^{24}$$

$$\begin{aligned} \text{no of O atoms} &= N_0 \times 4 \\ &= 1,505 \times 10^{24} \times 4 \\ &= 6,02 \times 10^{24} \text{ atoms} \end{aligned}$$

(5)

QUESTION 10

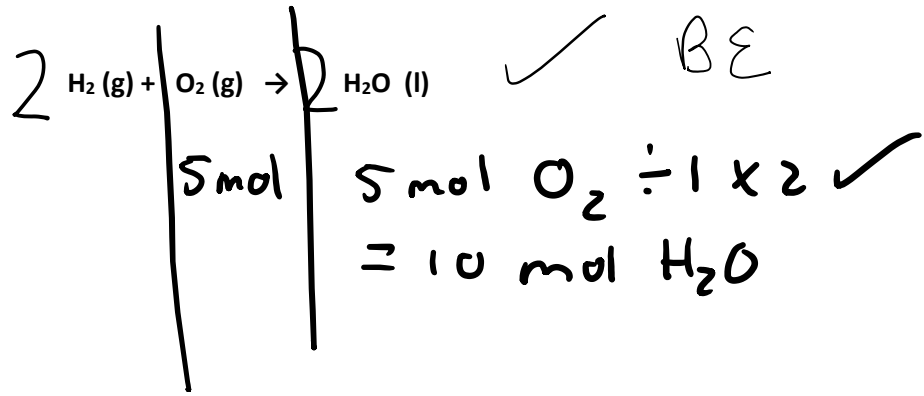
(6)

10.1 exothermic

(1)

10.2

∴



$$\therefore m = nM \quad \checkmark = 10 \times 18 \quad \checkmark$$

$$= 180 \text{ g} \cdot \text{mol}^{-1} \quad \checkmark$$

(5)

QUESTION 11 ✓

(9)

11.1 an acid is a proton donor

(1)

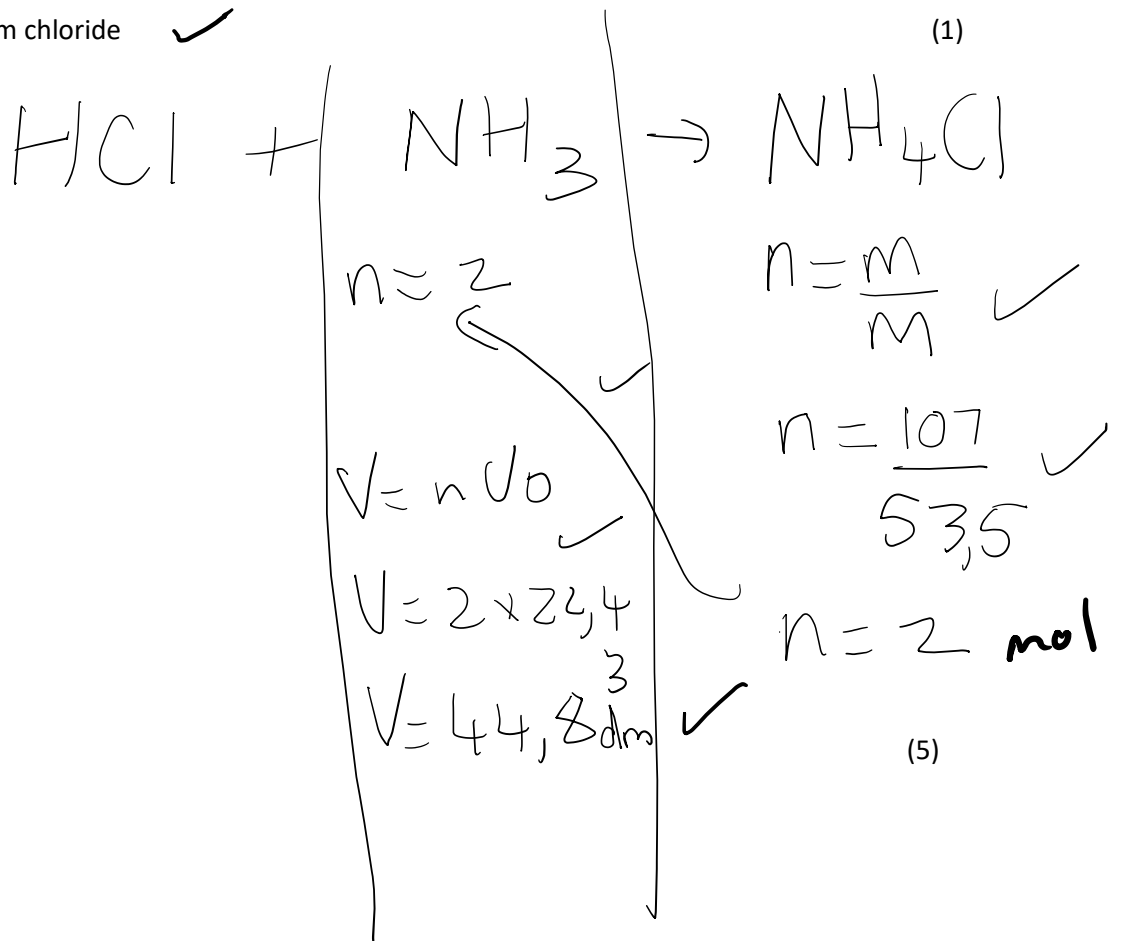
11.2.1 $\text{HCl} + \text{NH}_3 \rightarrow \text{NH}_4\text{Cl}$ ✓ ✓

(2)

11.2.2 ammonium chloride ✓

(1)

11.2.3



(5)

QUESTION 12

(14)

12.1

$$m = \frac{CMV}{1000} \checkmark$$

$$m = \frac{0,25 \times 56 \times 250}{1000} \checkmark$$

$$m = 3,5 \text{ g} \checkmark$$

(4)

12.2.1

$$n = CV \checkmark$$

$$n = 0,25 \times \frac{50}{1000} \checkmark$$

$$n = 0,0125 \text{ mol} \checkmark$$

(3)

12.2.2

$$\begin{array}{l|l} \text{KOH} & \text{K}_2\text{SO}_4 \\ & 0,0125 \text{ mol} \div 2 \times \checkmark \\ & = 0,00625 \text{ mol} \end{array}$$

$$\text{mass of } \text{K}_2\text{SO}_4 = 0,00625 \times 174 \checkmark$$

$$m \text{ of } \text{K}_2\text{SO}_4 = 1,0875 \text{ g} \checkmark$$

(4)

$$12.2.3 \quad \% \text{ yield} = \frac{\text{actual mass}}{\text{theoretical mass}} \times 100 \%$$

$$\% \text{ yield} = \frac{0,87}{1,09} \times \frac{100}{1}$$

$$\text{Yield} = 79,82 \%$$

(3)

TOTAL 100

EXTENTION QUESTION