

aii) Observation 1 :- effervescence

Observation 2 :- white ppt. forms

bi) Moles of acid

$$2.00 \times 0.025$$

$$= 0.05 \text{ mol}$$

bii) Moles of BaCO_3

$$\frac{0.05}{2}$$

$$2$$

$$= 0.025 \text{ mol}$$

Mass of BaCO_3

$$0.025 \times 197.3$$

$$= 4.93 \text{ g}$$

biii) Excess barium carbonate was used to ensure that all hydrochloric acid had reacted completely.

biv) By the process of filtration. Set up a filtration apparatus like a filter funnel and pour the solution. Insoluble BaCO_3 will remain in the filter funnel.

bv) Moles of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$

$$\frac{5.35}{244}$$

$$244$$

$$= 0.0219 \text{ mol}$$

~~Mass of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ Theoretical yield~~

~~$$0.0219 \times 244$$~~

Percentage yield

$$\frac{0.0219}{0.025} \times 100$$

$$= 87.6\%$$

bvi) Some products may be lost during filtration process.

2ai)	N	H	S	O	
	14.42	3.09	33.06	49.43	— Mass (g)
	1.03	3.06	1.03	3.09	— Moles (mol)
	1	3	1	3	

Empirical formula :- NH_3SO_3

a ii) Molar mass of NH_3SO_3

$$= 97 \text{ g/mol}$$

$$\text{Ratio} = \frac{97}{97.1} = 1$$

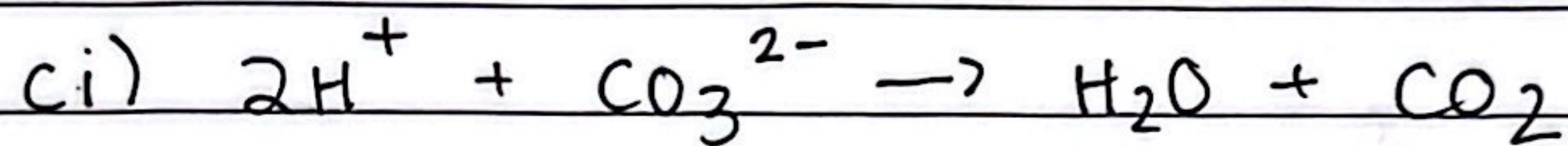
$$(\text{NH}_3\text{SO}_3) \times 1$$

$$= \text{NH}_3\text{SO}_3$$

bi)

$$\text{bii)} \quad \frac{66}{24000} = 0.00275 \text{ mol}$$

biii)



cii) It is weaker acid than HCl acid.

3ai) $\frac{0.0584}{24}$

$= 0.0024 \text{ mol}$

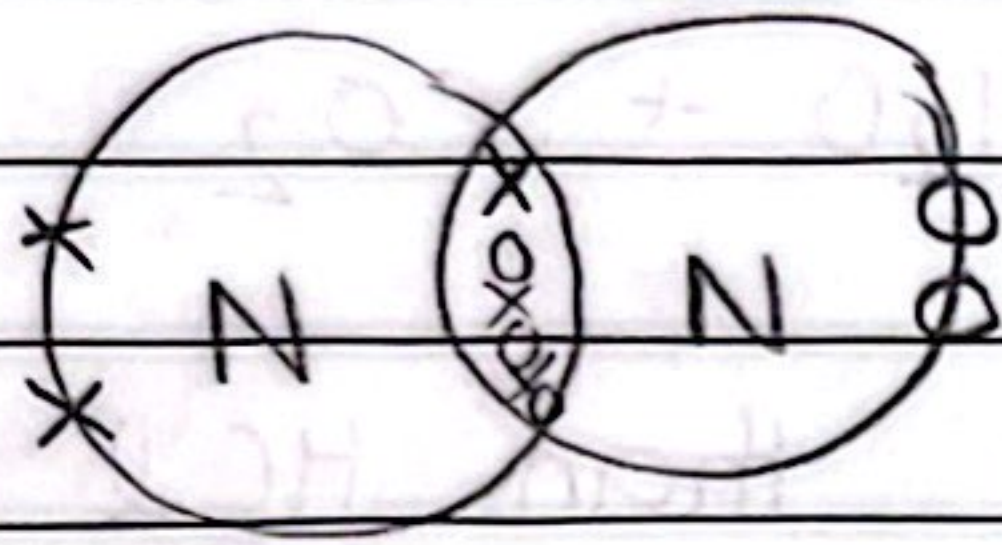
aii) 0.0024×84
 $= 0.2 \text{ g}$

aiii) $\frac{0.2}{0.227} \times 100$
 $= 88 \%$

bi) $\frac{0.4}{58.4} \times 100$
 $= 0.68 \%$

bii) CO_2 dissolves in water and reacts
 $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$

4ai)



aii) Mol of N_2

$$\frac{5.60}{28}$$

$$= 0.20$$

$$0.20 \times 2 = 0.40$$

$$0.40 \times 6.02 \times 10^{23}$$

Number of N atoms

$$= 2.408 \times 10^{23}$$

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aiii) Vol. of N_2

$$\frac{108}{1 \times 10^6}$$

$$= 1.08 \times 10^{-4} \text{ m}^3$$

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$$\text{Temp} = 25 + 273$$

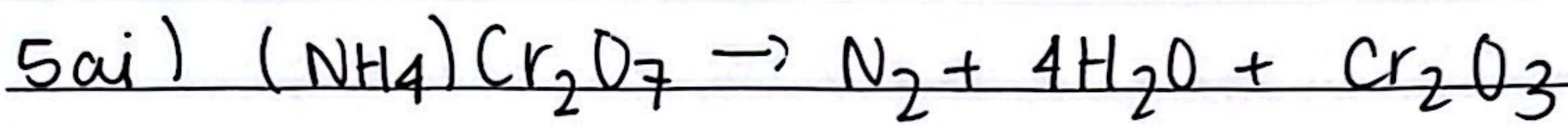
$$= 298 \text{ K}$$

$$n = \frac{pV}{RT}$$

$$= \frac{1.36 \times 10^5 \times 1.08 \times 10^{-4}}{8.31 \times 298}$$

$$= 0.0059 \text{ mol}$$

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aii) thermal decomposition

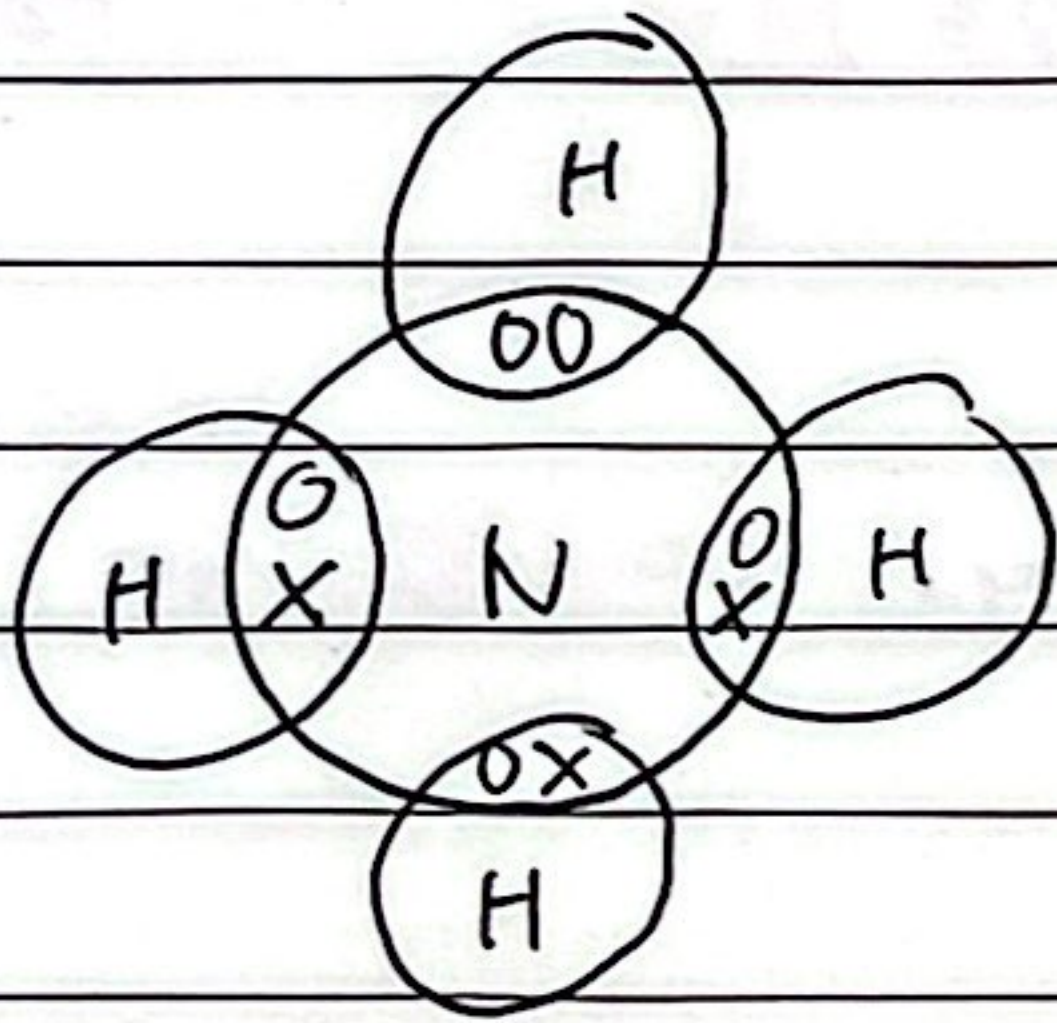
bi) $T = \frac{101000 \times 0.0000252}{0.001 \times 8.31}$

$= 306.28 \text{ K}$

$306.28 - 273$

$= 33.28^\circ \text{C}$

c)



di) Alkanes are flammable and dichromate is an oxidising agent so it might cause a reaction.

dii) 1 x

2 x

3 ✓

4 ✓

5 ✓

6 x

6) The presence of NH_4^+ ions from NH_4Cl reduces the number of OH^- ions so $\text{Mg}(\text{OH})_2$ cannot precipitate.

$$\begin{aligned} 7) \text{ Total HCl acid} \\ &= 2.95 \times 1100 \\ &= 3245 \text{ mg} \end{aligned}$$

Moles of HCl

$$\begin{aligned} &\frac{3245}{36.5 \times 1000} \\ &= 0.089 \text{ mol} \end{aligned}$$

Mole of $\text{Al}(\text{OH})_3$

$$\begin{aligned} &= \frac{2}{3} \times 0.089 \\ &= 0.059 \text{ mol} \end{aligned}$$

Mass of $\text{Al}(\text{OH})_3$

$$\begin{aligned} &= 0.059 \times 78 \\ &= 4.6 \text{ g} \end{aligned}$$

Number of tablets

$$\begin{aligned} &\frac{4.6}{0.23} \end{aligned}$$

~~8.26~~

$$= 20 \text{ tablets}$$