

$$\textcircled{1} \rho = \frac{M}{V}$$

$$V = 38.5 - 30.0 = 8.5$$

$$\frac{48.40}{8.5} = \underline{5.694 \text{ g/mL}}$$

$$\textcircled{2} \text{ Volume} = 25.0 \text{ mL}$$

$$\text{Mass} = 111.5 - 74.85 = 36.65 \text{ g}$$

$$\rho = \frac{M}{V} = \frac{36.65}{25} = \underline{1.466 \text{ g/cm}^3}$$

$$\textcircled{3} \text{ Molar mass of CaF}_2 = 78$$

$$\text{Moles} = \frac{75}{78} = \underline{0.961 \text{ Moles}}$$

$$\textcircled{4} \text{ 1 mole at STP} = 22.4 \text{ dm}^3$$

$$\begin{array}{l} \text{1 mole} = 22.4 \\ \times 42 \end{array}$$

$$\frac{42 \times 1}{22.4} = \underline{1.875 \text{ moles}}$$

$$5 \text{ moles of } \text{Fe}_2\text{O}_3 = \frac{3}{159.69} = 0.0188 \text{ mole}$$

$$\begin{array}{ccc} \text{Mole Ratio } \text{Fe}_2\text{O}_3 & : & \text{Fe}(\text{CrO}_2)_2 \\ 2 & & 4 \\ & & 0.0188 \end{array}$$

$$\text{Moles} = \frac{0.0188 \times 4}{2} = \underline{\underline{0.0376}}$$

$$6 \text{ moles of } \text{K}_2\text{CrO}_4$$

$$\frac{4}{194.1896} = 0.0206 \text{ moles}$$

$$\text{Moles of } \text{Fe}(\text{CrO}_2)_2 = \frac{0.0206 \times 4}{8}$$

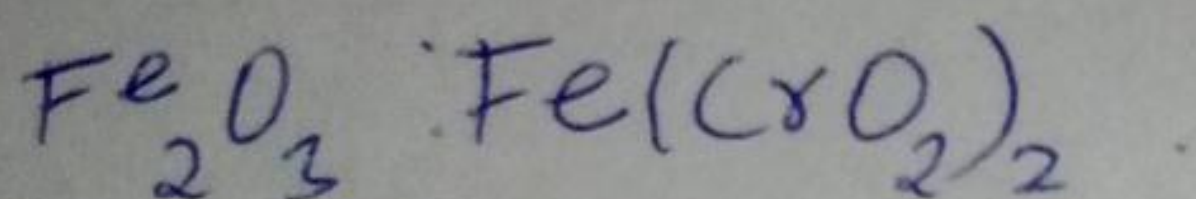
$$= 0.0103 \text{ moles}$$

$$\begin{aligned} \text{Mass} &= 0.0103 \times 223.83 = \\ &= \underline{\underline{2.3059}} \end{aligned}$$

7. moles of $\text{Fe}(\text{CrO}_2)_2$

$$\frac{10}{223.83} = 0.0447 \text{ moles}$$

Ratio:



$$2 : 4$$

$$0.0447$$

$$\begin{aligned} \text{moles of } \text{Fe}_2\text{O}_3 &= 0.0447 \times 2 \\ &\quad \underline{4} \\ &= 0.0223 \text{ moles} \end{aligned}$$

$$\text{Mass} = 0.0223 \times 159.69 = \underline{3.56729}$$

$$\text{Yield} = \frac{2.90 \times 100}{3.5672} = 81.296\%$$

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Moles of $\text{Fe}(\text{CrO}_2)_2$

$$8) \frac{100}{223.83} = 0.447 \text{ moles}$$

$$\text{Moles } \text{K}_2\text{CO}_3 = \frac{50}{138} = 0.3623 \text{ moles}$$

Ratio of $\text{Fe}(\text{CrO}_2)_2 : \text{K}_2\text{CO}_3$

$$1 : 2$$

hence the limiting Reactant is K_2CO_3 since it used up completely.

$$9) \text{N} = \text{SP}^3$$

$$\text{O} = \text{SP}^2 \text{ hybridised}$$

10) Dilution

$$M_1 V_1 = M_2 V_2$$

$$5 \times V = 0.3 \times 160$$

$$V = \frac{0.3 \times 160}{5}$$

$$V = \underline{\underline{9.6 \text{ ml}}}$$