42.081 g/mol

53.064 g/mol

$$4 C_3H_6 + 6 NO \longrightarrow 4 C_3H_3N + 6 H_2O + N_2$$

propylene   acrylonitrile

Calculate how many grams of acrylonitrile could be obtained from 651 kg of propylene, assuming there is excess NO present.

1 - Convert 651 kg propylene to moles. Use FORMULA WEIGHT. (and a kg -> g conversion)
2 - Convert moles propylene to moles acrylonitrile. Use BALANCED CHEMICAL EQUATION
3 - Convert moles acrylonitrile to grams. Use FORMULA WEIGHT.

① $42.081 \text{ g } C_3H_6 = \text{mol } C_3H_6$ $Kg = 10^3 g$

② $4 \text{ mol } C_3H_6 = 4 \text{ mol } C_3H_3N$

③ $53.064 \text{ g } C_3H_3N = \text{mol } C_3H_3N$

$$651 \text{ kg } C_3H_6 \times \frac{10^3 g}{Kg} \times \frac{\text{mol } C_3H_6}{42.081 \text{ g } C_3H_6} \times \frac{4 \text{ mol } C_3H_3N}{4 \text{ mol } C_3H_6} \times \frac{53.064 \text{ g } C_3H_3N}{\text{mol } C_3H_3N} =$$

$\underbrace{\hspace{4cm}}_{①}$ $\underbrace{\hspace{2cm}}_{②}$ $\underbrace{\hspace{2cm}}_{③}$

$$= \boxed{821000 \text{ g } C_3H_3N} \; (821 \text{ kg})$$

151.90 g/mol

$$10 \text{ FeSO}_4 + 2 \text{ KMnO}_4 + 8 \text{ H}_2\text{SO}_4 \rightarrow 5 \text{ Fe}_2(\text{SO}_4)_3 + 2 \text{ MnSO}_4 + \text{K}_2\text{SO}_4 + 8 \text{ H}_2\text{O}$$
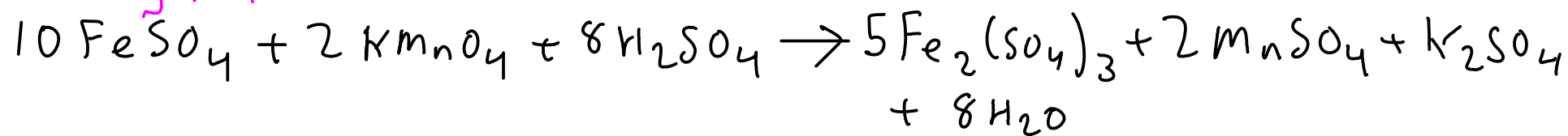
How many mL of 0.250M potassium permangenate are needed to react with 3.36 g of iron(II) sulfate?

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1 - Convert 3.36 g iron(II) sulfate to moles. Use FORMULA WEIGHT.
2 - Convert moles iron(II) sulfate to moles potassium permangenate. Use CHEMICAL EQUATION.
3 - Convert moles potassium permangenate to solution volume. Use MOLARITY.

① $151.90 \text{ g FeSO}_4 = \text{mol FeSO}_4$ ② $10 \text{ mol FeSO}_4 = 2 \text{ mol KMnO}_4$

③ $0.250 \text{ mol KMnO}_4 = L$ $mL = 10^{-3} L$

$$3.36 \text{ g FeSO}_4 \times \frac{\text{mol FeSO}_4}{151.90 \text{ g FeSO}_4} \times \frac{2 \text{ mol KMnO}_4}{10 \text{ mol FeSO}_4} \times \frac{L}{0.250 \text{ mol KMnO}_4} \times \frac{mL}{10^{-3} L} =$$

$$= \boxed{17.7 \text{ mL of } 0.250 \text{ M KMnO}_4}$$