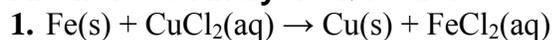


Investigation 8.B: Determining the Percentage Yield of a Chemical Reaction Answer Key

Answers to Analysis Questions



$$m_{\text{Fe}} = 1.00 \text{ g}$$

$$M_{\text{Fe}} = 55.85 \frac{\text{g}}{\text{mol}}$$

$$m_{\text{CuCl}_2} = ? \text{ g}$$

$$M_{\text{CuCl}_2} = 134.45 \frac{\text{g}}{\text{mol}}$$

$$m_{\text{CuCl}_2} = (1.00 \text{ g Fe}) \left(\frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} \right) \left(\frac{1 \text{ mol CuCl}_2}{1 \text{ mol Fe}} \right) \left(\frac{134.45 \text{ g CuCl}_2}{1 \text{ mol CuCl}_2} \right)$$

$$m_{\text{CuCl}_2} = 2.41 \text{ g}$$

Since 1.00 g of Fe(s) required only 2.41 g of CuCl₂(aq) to completely react, the addition of 5.00 g of this reactant ensures it is the reactant in excess.

- Sources of error can include product loss during decanting, an incomplete reaction between the iron and copper(II) chloride, the product not being completely dry, or impure iron in the steel wool.
- Percentage yield could be improved by altering the type of steel wool used, increasing the concentration of the copper(II) chloride, using a more careful laboratory technique, or allowing for a longer drying period.

Answer to Conclusion Question

4. Use the formula $\text{Percentage Yield} = \frac{\text{Experimental Yield}}{\text{Predicted Yield}} \times 100\%$

Solve using the mass of copper obtained from the experiment and your prediction.

Answer to Extension Question

- The precision of a result is related to the sensitivity of the equipment used to make the measurements.
 - The precision of the result could be improved by using more sensitive measuring instruments.
 - The accuracy of the result may have been affected by poor experimental technique, such as a loss of product during decanting or the product not being completely dry before measuring. An incomplete reaction or impure reactants also may have affected the accuracy of the result.
 - You should list factors such as improved experimental technique and higher quality steel wool.