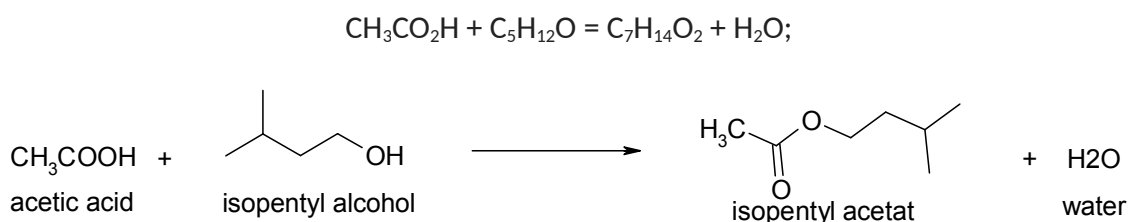


Answer on Question #61469 - Chemistry - General Chemistry

Task:

If 1.87 g of acetic acid ($\text{CH}_3\text{CO}_2\text{H}$) reacts with 2.31 g of isopentyl alcohol ($\text{C}_5\text{H}_{12}\text{O}$) to give 2.82 g of isopentyl acetate ($\text{C}_7\text{H}_{14}\text{O}_2$), what is the percent yield of the reaction?

Solution:



Find limiting reagent:

Limiting reagent - the reactant that runs out first in a chemical reaction.

$$1.87\text{g } \text{CH}_3\text{COOH} \left(\frac{1 \text{ mol } \text{CH}_3\text{COOH}}{60\text{g } \text{CH}_3\text{COOH}} \right) = 0.0317 \text{ mol } \text{CH}_3\text{COOH};$$

$$2.31\text{g } \text{C}_5\text{H}_{12}\text{O} \left(\frac{1 \text{ mol } \text{C}_5\text{H}_{12}\text{O}}{88\text{g } \text{C}_5\text{H}_{12}\text{O}} \right) = 0.0263 \text{ mol } \text{C}_5\text{H}_{12}\text{O};$$

$$0.0317 \text{ mol } \text{CH}_3\text{COOH} \left(\frac{1 \text{ mol } \text{C}_5\text{H}_{12}\text{O}}{1 \text{ mol } \text{CH}_3\text{COOH}} \right) = 0.0317 \text{ mol } \text{C}_5\text{H}_{12}\text{O};$$

$$0.0317 \text{ mol} > 0.0263 \text{ mol};$$

$\text{C}_5\text{H}_{12}\text{O}$ - limiting reagent;

Then,

$$\text{Possible Yield} = 0.0263 \text{ mol } \text{C}_5\text{H}_{12}\text{O} \left(\frac{1 \text{ mol } \text{C}_7\text{H}_{14}\text{O}_2}{1 \text{ mol } \text{C}_5\text{H}_{12}\text{O}} \right) \left(\frac{130 \text{ g } \text{C}_7\text{H}_{14}\text{O}_2}{1 \text{ mol } \text{C}_7\text{H}_{14}\text{O}_2} \right);$$

$$\text{Possible Yield} = 0.0263 \times 130 = 3.419 \approx 3.42\text{g } \text{C}_7\text{H}_{14}\text{O}_2;$$

Find percent yield:

$$\text{Percent Yield} = \frac{\text{Actual Yield (g) recovered}}{\text{Possible Yield}} \times 100\%;$$

Actual Yield = 2.82 g;

Possible Yield = 3.42 g;

$$\text{Percent Yield} = \frac{2.82\text{g}}{3.42\text{g}} \times 100\% = 82.46\%;$$

Answer:

The percent yield of the reaction is 82.46%.