

4.11 Key Steps in Laboratory Synthesis 3 Answers

1. 48.15%

2. a) methoxy -2-methylpropane

b) 2-chloromethane \rightarrow compound x

92.5g \rightarrow 88g

9.25g $\rightarrow (88 / 92.5) \times 9.25 = 8.8\text{g}$

% yield = 68.75% \times 8.8g

%yield = 6.05g

3. Overall % yield = $0.8 \times 0.6 = \underline{48\%}$

4. 3-methylbutan-1-ol is the limiting reactant and is used in the calculation.

3-methylbutan-1-ol \rightarrow 3-methyl-1-butylethanoate

88g \rightarrow 130g

9.7g $\rightarrow (130\text{g} / 88\text{g}) \times 9.7\text{g} = 14.33\text{g}$

Mass of ester (3-methyl-1-butylethanoate) = $0.67 \times 14.33\text{g} = \underline{9.6\text{g}}$

5. Ethanoic acid \rightarrow Ethanal

60g \rightarrow 44g

12g $\rightarrow (44\text{g} / 60\text{g}) \times 12\text{g} = 8.8\text{g}$ (mass required assuming 100% yield)

As the % yield is 57%, mass of ethanal required is: $8.8\text{g} / 0.57 = \underline{15.44\text{g}}$

6. Overall % yield = $0.9 \times 0.5 \times 0.75 = 33.75\%$

1,2-dihydroxybenzene \rightarrow Adrenaline

110g \rightarrow 183g

15g $\rightarrow (183\text{g} / 110\text{g}) \times 15 = 24.95\text{g}$

Mass of adrenaline produced = 0.3375 (33.75%) \times 24.95g = 8.42g