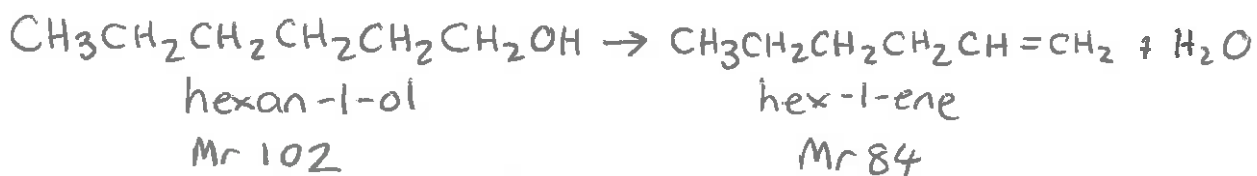


# Percentage Yield

- ① In an experiment to produce a sample of hex-1-ene, 10.2g of hexan-1-ol was heated with an excess of phosphoric(V) acid. (The phosphoric(V) acid simply acts as a dehydrating agent, removing water from the hexan-1-ol).

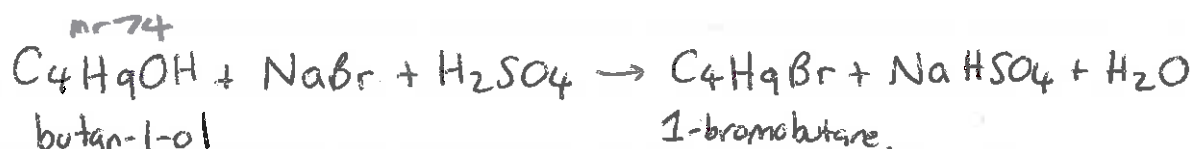
After purification of the hex-1-ene, 5.04g was produced. Calculate the percentage yield.



$$\frac{10.2}{102} = 0.1 \text{ mole} \quad 0.1 \times 84 = 8.4$$

$$\frac{5.04}{8.4} \times 100 = 60\%$$

② A sample of 1-bromobutane was made by treating 8.0 cm<sup>3</sup> of butan-1-ol with an excess of sodium bromide and concentrated sulphuric acid. After purification 3.7 cm<sup>3</sup> of 1-bromobutane had been produced. Calculate the percentage yield. ~~Density~~



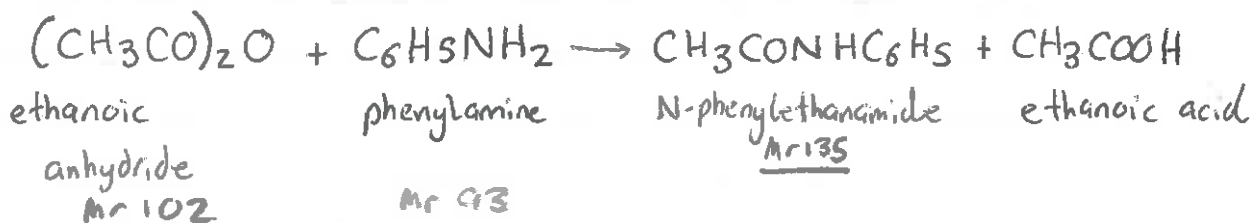
Densities: butan-1-ol = 0.810 g cm<sup>-3</sup>  
 1-bromobutane = 1.28 g cm<sup>-3</sup>

$$\begin{aligned} 8 \times 0.810 &= 6.48 \text{ g} \\ 3.7 \times 1.28 &= 4.736 \text{ g} \end{aligned}$$

$$\frac{6.48}{74} = 0.08756 \text{ moles} \qquad 0.08756 \times 137 = 11.995$$

$$\frac{4.736}{11.995} \times 100 = 39.5\%$$

③  $4.0\text{cm}^3$  of phenylamine was treated with  $6.0\text{cm}^3$  of ethanoic anhydride under suitable conditions, and the solid product (~~N-phenyl~~ (N-phenylethanamide) was purified.  $4.15\text{g}$  was produced. Calculate the percentage yield.



Densities: ethanoic anhydride =  $1.08\text{gcm}^{-3}$   
 phenylamine =  $1.02\text{gcm}^{-3}$

$$4.0 \times 1.02 = 4.08\text{g}$$

$$6.0 \times 1.08 = 6.48$$

$$\frac{4.08}{93} = 0.044$$

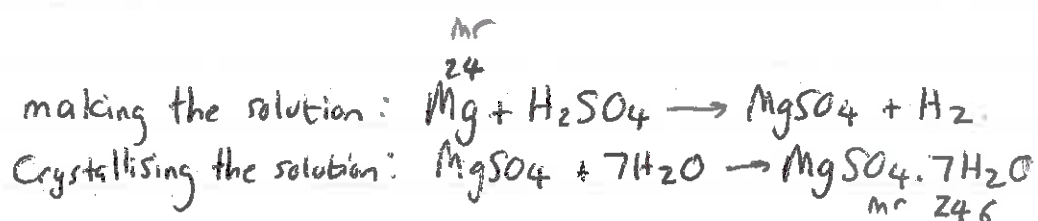
↑  
Limiting factor

$$\frac{6.48}{102} = 0.064$$

$$0.044 \times 135 = 5.94\text{g}$$

$$\frac{4.15}{5.94} \times 100 = 69.8\%$$

④ A student had to produce some magnesium sulphate crystals, ~~MgSO<sub>4</sub>~~ MgSO<sub>4</sub> · 7H<sub>2</sub>O. He reacted 1.20g of magnesium with a slight excess of sulphuric acid to give magnesium sulphate solution, and then evaporated off about three-quarters of the liquid, before leaving it to crystallise. He separated the crystals from the remaining liquid, dried them and weighed them. 9.84g of crystals had been produced. Calculate the percentage yield.



$$\frac{1.20}{24} = 0.05 \quad 0.05 \times 246 = 12.3$$

$$\frac{9.84}{12.3} \times 100 = \underline{\underline{80\%}}$$