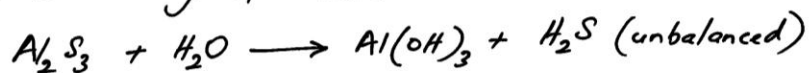


Limiting Reactant (Exercises)

Example 2:

Calculate the maximum numbers of moles and grams of H_2S than can form when 158g of aluminium sulfide reacts with 131g of water:

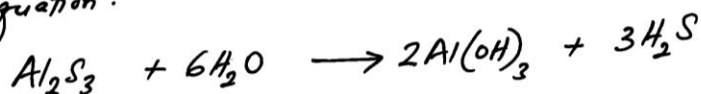


What mass of the excess reactant remains?

Solution :

• It is a limiting-reactant problem, since amounts of two reactants are given.

Balanced equation:



$$n_{Al_2S_3} = \left(\frac{158g}{150.17 \text{ g mol}^{-1}} \right) = 1.05 \text{ mol}$$

$$n_{H_2O} = \left(\frac{131g}{18.02 \text{ g mol}^{-1}} \right) = 7.27 \text{ mol}$$

$$\left\{ \begin{array}{l} M_r(Al_2S_3) = 150.17 \text{ g mol}^{-1} \\ M_r(H_2O) = 18.02 \text{ g mol}^{-1} \\ M_r(H_2S) = 34.09 \text{ g mol}^{-1} \end{array} \right.$$

$$r_{\text{theory}} = \frac{n_{Al_2S_3}}{n_{H_2O}} = \frac{1}{6} = 0.167 \text{ (the ratio is from the balanced equation)}$$

$$r_{\text{experiment}} = \frac{n_{Al_2S_3}}{n_{H_2O}} = \frac{1.05}{7.07} = 0.149$$

$$r_{\text{experiment}} (0.149) < r_{\text{theory}} (0.167)$$

Therefore, the numerator is a small value (ie. Al_2S_3 = limiting-reactant), whereas the denominator, n_{H_2O} is a big value (ie. H_2O is in excess)

