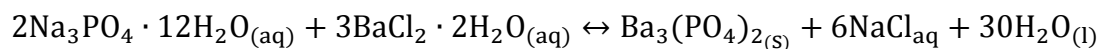


Answer on Question #62925 - Chemistry | General Chemistry

When 3.802g of $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ reacted with excess $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$, how many moles of $\text{Ba}_3(\text{PO}_4)_2$ would be produced?

Solution



The balanced equation tells us that 6 moles of H_2O will produce 4 moles of H_3PO_4

$$m(\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}) = 3.802 \text{ (g)}$$

$$M(\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}) = 308.12 \text{ (g/mol)}$$

$$n(\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}) = \frac{m}{M} = \frac{3.802 \text{ g}}{308.12 \text{ g/mol}} = 0.012 \approx 0.01 \text{ mol}$$

The ratio of $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ to $\text{Ba}_3(\text{PO}_4)_2$ is 2 to 1, so only 1/2 as much $\text{Ba}_3(\text{PO}_4)_2$ will form.

$$n(\text{Ba}_3(\text{PO}_4)_2) = 0.01 \text{ mol} \cdot \frac{1}{2} = 0.005 \text{ mol}$$

Answer

$$n(\text{Ba}_3(\text{PO}_4)_2) = 0.005 \text{ mol}$$