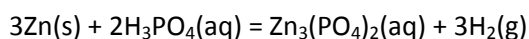


**Task:**

How many grams of zinc phosphate are formed when 10.0 grams of zinc react with excess phosphoric acid

**Solution:**

The chemical equation for this reaction is



The molar weight of zinc phosphate is

$$\text{MW}(\text{Zn}_3(\text{PO}_4)_2) = 3 \cdot \text{MW}(\text{Zn}) + 2 \cdot \text{MW}(\text{P}) + 8 \cdot \text{MW}(\text{O})$$

$$\text{MW}(\text{Zn}_3(\text{PO}_4)_2) = 3 \cdot 65 + 2 \cdot 31 + 8 \cdot 16 = 385 \text{ g/mol}$$

The number of moles of Zn is

$$n(\text{Zn}) = m(\text{Zn}) / \text{MW}(\text{Zn}) = 10.0 / 65 = 0.154 \text{ mol}$$

The number of moles of  $\text{Zn}_3(\text{PO}_4)_2$  is

$$n(\text{Zn}_3(\text{PO}_4)_2) = n(\text{Zn}) / 3 = 0.154 / 3 = 0.051 \text{ mol}$$

The mass of  $\text{Zn}_3(\text{PO}_4)_2$  is

$$m(\text{Zn}_3(\text{PO}_4)_2) = n(\text{Zn}_3(\text{PO}_4)_2) \cdot \text{MW}(\text{Zn}_3(\text{PO}_4)_2) = 0.051 \cdot 385 = 19.6 \text{ g}$$

**Answer:**  $m(\text{Zn}_3(\text{PO}_4)_2) = 19.6 \text{ g}$