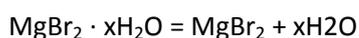


Task:

A 3.592 (g) sample of hydrated magnesium bromide, $\text{MgBr}_2 \cdot x\text{H}_2\text{O}$, is dried in an oven. When the anhydrous salt is removed from the oven, its mass is 2.263 g. What is the value of x

Solution:

The mass has changed because the water has vaporized.



The mass of water is

$$m(\text{H}_2\text{O}) = m_1 - m_2$$

m_1 – mass before drying (g)

m_2 – mass after drying (g)

$$m(\text{H}_2\text{O}) = 3.592 - 2.263 = 1.329 \text{ g}$$

The mass of MgBr_2 is 2.263 g

The molar weight of MgBr_2 is

$$\text{MW}(\text{MgBr}_2) = \text{MW}(\text{Mg}) + 2 \cdot \text{MW}(\text{Br}) = 24 + 2 \cdot 80 = 184 \text{ g/mol}$$

The number of moles of MgBr_2 is

$$n(\text{mol}) = m(\text{g}) / \text{MW}(\text{g/mol})$$

$$n(\text{MgBr}_2) = 2.263 / 184 = 0.0123 \text{ mol}$$

The number of moles of H_2O is

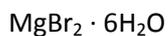
$$n(\text{H}_2\text{O}) = 1.329 / 18 = 0.0738$$

The ratio of indexes is equal to the ratio of moles

$$1 : x = n(\text{MgBr}_2) : n(\text{H}_2\text{O}) = 0.0123 : 0.0738 = 1 : 6$$

$$x = 6$$

The formula of hydrated magnesium bromide is



Answer: $x = 6$