Answer on the question #60488, Chemistry / Other

Question:

10.0g of hydrated sodium sulfate decompose to form 4.40g of anhydrous sodium sulfate on heating. Calculate the formula mass of hydrated sodium sulfate and the value of x

Solution:

The mass and number of the moles of water evaporated during the heating is:
$$m(H_2O) = 10.0 - 4.40 = 5.6\ g,$$
$$n(H_2O) = \frac{m(H_2O)}{M(H_2O)} = \frac{5.6}{18.01528} = 0.31\ mol.$$
The number of the moles of sodium sulfate is:
$$n(NaSO_4) = \frac{m(NaSO_4)}{M(NaSO_4)} = \frac{4.4}{142.04} = 0.031\ mol.$$
Then, we can find the ratio of number of the moles of water and sodium sulfate, that corresponds to the ratio of the number of molecules:
$$\frac{n(H_2O)}{n(NaSO_4)} = \frac{0.31}{0.031} = 10.$$
So, there are 10 molecules of water per molecule of sodium sulfate. The formula is $Na_2SO_4\cdot10H_2O$.

Answer: $Na_2SO_4\cdot10H_2O$; x=10