Answer on the question #60484, Chemistry / Physical Chemistry

Question:
A solution with weight percent of sodium hydroxide of 6% is prepared by adding the following mass of water to 200 grams of that solution with a weight percent of NaOH of 30%. Find the amount of water to be added?

Solution:

The mass percent of NaOH in solution can be calculated as:

$$\omega = \frac{m\ (NaOH)}{m(NaOH) + m(H_2O)},$$

where $m\ (NaOH)$ is the mass of sodium hydroxide and $m(H_2O)$ is the mass of water. $m(NaOH) + m(H_2O)$ is the sum of their masses, that means the mass of the solution.
Then, we can write a system of equations for former and resulting concentrations:

$$0.3 = \frac{m\ (NaOH)}{200},$$

$$0.06 = \frac{m\ (NaOH)}{200 + m'(H_2O)},$$

where $m'(H_2O)$ is the mass of added water. If we divide the first equation by the last, we get:

$$\frac{0.3}{0.06} = \frac{200 + m'(H_2O)}{200},$$

$$5 * 200 = 200 + m'(H_2O)$$

$$m'(H_2O) = 800\ g$$

Answer: 800g.