**Task:**
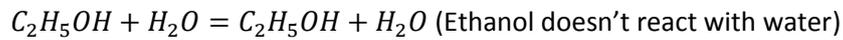
A solution was prepared by mixing 10 mole of alcohol and 10 mole of water. What is the composition of solution expressed in mole fraction?

**Solution:**

$C_2H_5OH + H_2O = C_2H_5OH + H_2O$ (Ethanol doesn't react with water)

The mole fraction $x_i$ is defined as the amount of a constituent $n_i$ divided by the total amount of all constituents in a mixture $n_{tot}$ :

$$x_i = \frac{n_i}{n_{tot}}; \; x_{eth} = \frac{n_{eth}}{n_{tot}} = \frac{10}{20} = 0.5; \; x_{water} = \frac{n_{water}}{n_{tot}} = \frac{10}{20} = 0.5$$

The sum of all the mole fractions is equal to 1:

$$\sum_{i=1}^{N} n_i = n_{tot}; \sum_{i=1}^{N} x_i = 1$$

**Answer:**

$x_{eth} = 0.5;$

$x_{water} = 0.5;$

$$\sum_{i=1}^{N} x_i = 1$$