#78451 Chemistry, General Chemistry

In a glass of iced tea, we have added 3 tbsp of sugar ($C_{12}H_{22}O_{11}$) the volume of the tea (water) is 325 ml. What is the mole fraction of the sugar in the tea solution (1 tbsp sugar = 25 g).

Answer:

$$x_i = \frac{n_i}{n_{tot}}$$

$$n = \frac{m}{M}$$

M (H_2O) = 18 g/mol

M ($C_{12}H_{22}O_{11}$) = 342 g/mol

ρ (H_2O) = 1 g/ml m (H_2O) = 325 x 1 = 325 g

$$n\ (H_2O) = \frac{325}{18} = 18.1\ mol$$

$$n\ (C_{12}H_{22}O_{11}) = \frac{3 \times 25}{342} = 0.2\ mol$$

$$x_{C_{12}H_{22}O_{11}} = \frac{0.2}{0.2 + 18.1} = 0.01$$