Answer on Question #56064 – Chemistry - General chemistry

Question:

A 2.50 g sugar cube (sucrose: $C_{12}H_{22}O_{11}$) is dissolved in a 350 mL teapot containing 80°C water (density of water at 80°C= 0.975 g/mL).

What is the molality of the sugar solution?

Express the molality with the appropriate units.

Answer:

$C_M = \frac{v}{m}$ $v = \frac{m}{M}$

$\rho = \frac{m}{V}$ $m = \rho V$

$m(H_2O) = 0.975 \cdot 350 = 341\ g$

M($C_{12}H_{22}O_{11}$)=343.77 g/mol

$$v(C_{12}H_{22}O_{11}) = \frac{2.50}{343.77} = 0.01\ mol$$

$$C_M(C_{12}H_{22}O_{11}) = \frac{0.01}{0.341} = 0.03\ mol/kg$$