Answer on the Question #63901, Chemistry / General chemistry

(a)Describe the process of preparing 340 mL of a 0.800 M sucrose solution, assuming that you start with solid sucrose, $C_{12}H_{22}O_{11}$. (b)Explain how to prepare 220.0 mL of a 0.260 M solution starting with 7.00 L of a 2.50 M $C_{12}H_{22}O_{11}$ solution.

Solution:

(a) To prepare solution of sucrose with molar concentration we need to take the determined mass of sucrose and dissolve in determined volume of water. Calculate the mass of sucrose we can by this equation:

$$m(sucrose) = \frac{C \cdot V_{solution} \cdot M_{sucrose}}{1000} = \frac{0.800 \cdot 340 \cdot 342}{1000} = 93\ g$$

We know, that mass of solution is 340 mL, it means that mass of water is the difference between the mass of solution and mass of sucrose (assuming that density of solution equal 1 g/ml):

$$m(water) = m(solution) - m(sucrose) = 340 - 93 = 247\ g$$

(b) To prepare 220 mL of 0.260 M of sucrose solution using the stoke solution we need to use the law of equivalents:

$$c_1 V_1 = c_2 V_2$$

We know the concentrations of both solutions and volume needed to prepare. Now we need to know the volume of the stoke solution needed to prepare solution 1:

$$0.8M \cdot 220ml = 2.5\ M \cdot V_2$$

$$V_2 = \frac{0.8M \cdot 220mL}{2.5M} = 70.4\ mL$$

In this case we are working with the volume phase and that is why we can calculate the volume of water:

$$V(water) = V(solution) - V_2 = 220 - 70.4 = 149.6\ mL$$

When we know the volume of the stoke solution and volume of water we are mixing they in one flask.

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