

## Answer on Question #83872 - Chemistry

When a 2.5 mol of sugar ( $C_{12}H_{22}O_{11}$ ) are added to a certain amount of water the boiling point is raised by 1 Celsius degree. If 2.5 mol of aluminum nitrate is added to the same amount of water, by how much will the boiling point be changed? Show all calculations leading to your answer OR use 3 – 4 sentences to explain your answer.

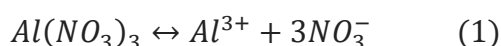
Solution:

First of all, it is necessary to find out the ratio of the ebullioscopic constant of water to mass of solvent. It is possible to do from the equation for sugar (the van't Hoff factor is 1, as the sugar do not dissociate in solution):

$$\Delta T_b = iK_b b = i * K_b * \frac{n_{solute}}{m_{solvent}}$$

$$1 = 1 * 2.5 * \frac{K_b}{m_{solvent}}$$

$$\frac{K_b}{m_{solvent}} = \frac{1}{2.5} = 0.4$$



As the 1 mole of aluminum nitrate produces 4 moles of particles in solution (1), the van't Hoff factor is 4. So, the change of boiling point is equal to:

$$\Delta T_b = iK_b b = 4 * 0.4 * 2.5 = 2.5^\circ$$

**Answer:**

**The boiling point of water will be changed by 2.5°.**