

Chemguide – questions

RAOULT'S LAW AND NON-VOLATILE SOLUTES

- State Raoult's Law for a non-volatile solute in a single volatile solvent.
 - Suppose you had a solution of 6.84 g of sugar (sucrose, $C_{12}H_{22}O_{11}$) in 90.0 g of water.
 - Calculate the number of moles of sugar and water present. (H=1; C=12; O=16)
 - Calculate the mole fraction of the water in the solution.
 - At $100^{\circ}C$, the saturated vapour pressure of water at its boiling point is 101325 Pa. Calculate the vapour pressure of the solution at that temperature. (Remember to give your answer to a suitable number of significant figures.)
 - Would the solution of sugar in water boil at this temperature, assuming the external pressure remains at 101325 Pa? Explain your answer.
- Raoult's Law only really works for ideal solutions. An ideal solution is defined as one which obeys Raoult's Law.

How do the following affect how ideal a solution is?

- The concentration of the solution.
 - The forces between the particles in the solution.
 - Changes to the solute molecules when they dissolve.
- The diagram shows a part of the phase diagram for water around the triple point.

a) Copy the diagram and sketch on it the equivalent diagram for a dilute solution of a non-volatile solute in water.

b) Use your diagram to explain what happens to the freezing point and boiling point of water when a non-volatile solute is dissolved in it.

