$Ca(NO_3)_2$ 20.0 g $\quad H_2O$ 80.0 $\quad \rho = 1.133$ g/mL

Ca = 40.078 $\quad$ N = 14.0067 $\quad$ O = 15.9994

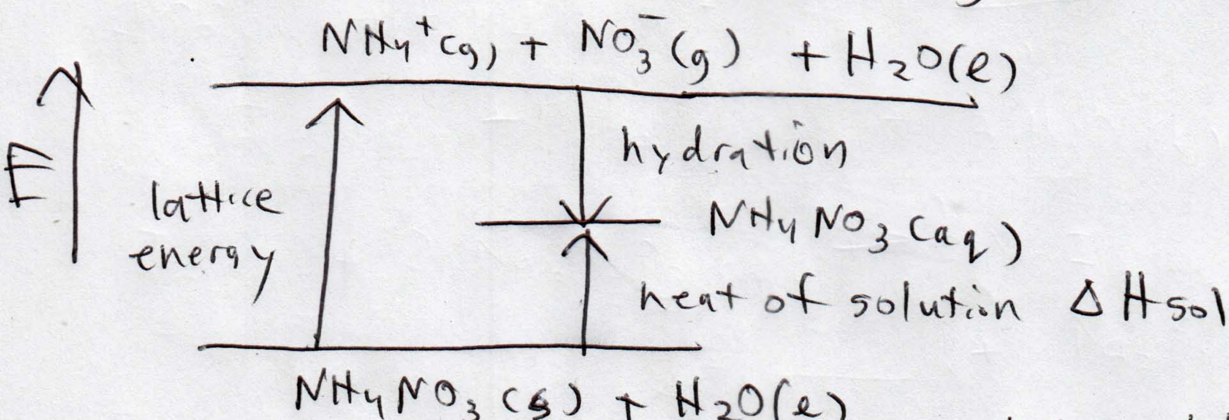
MM = 164.0878

$n_{Ca(NO_3)_2} = 20.0/164 = 0.122$ mol $Ca(NO_3)_2$

$M = \frac{\text{mol } Ca(NO_3)_2}{\text{L solution}}$ $\quad V_{solution} = 100\text{ g}/1.133\text{ g/mL} = 88.3$ mL

$\underline{M} = \frac{0.122 \text{ mol } Ca(NO_3)_2}{0.0883 \text{ L soln}} = 1.38\ \underline{M}$

$m = \frac{\text{mol solute}}{\text{kg solvent}} = \frac{0.122 \text{ mol } Ca(NO_3)_2}{0.0800 \text{ kg } H_2O} = 1.53$ m



$\Delta G = \Delta H - T\Delta S$

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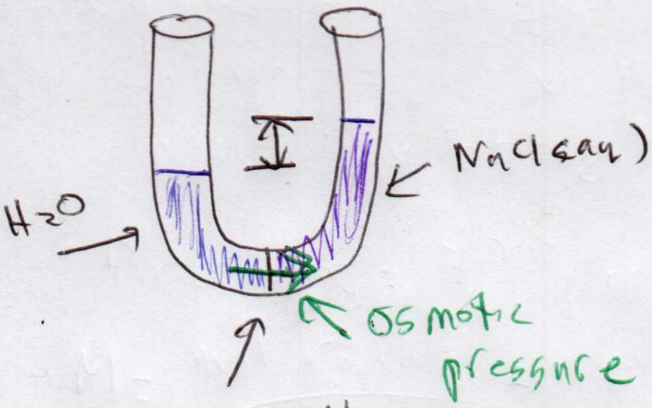
mole fraction $\chi = \frac{\text{moles of solute}}{\text{total moles in solution}}$

Raoult's law : $P = P_T \chi$

In ideal solutions, all molecules in the vapor phase act as ideal gasses (no IMF, no volume of gas molecules).

Osmotic pressure



semipermeable membrane (water can cross but not solute)

Osmotic pressure is due to water trying to dilute a solution to create as much entropy as possible.

$$\Pi V = nRT$$

$$\Pi = \left(\frac{n}{V}\right)RT$$

$$\Pi = MRT$$

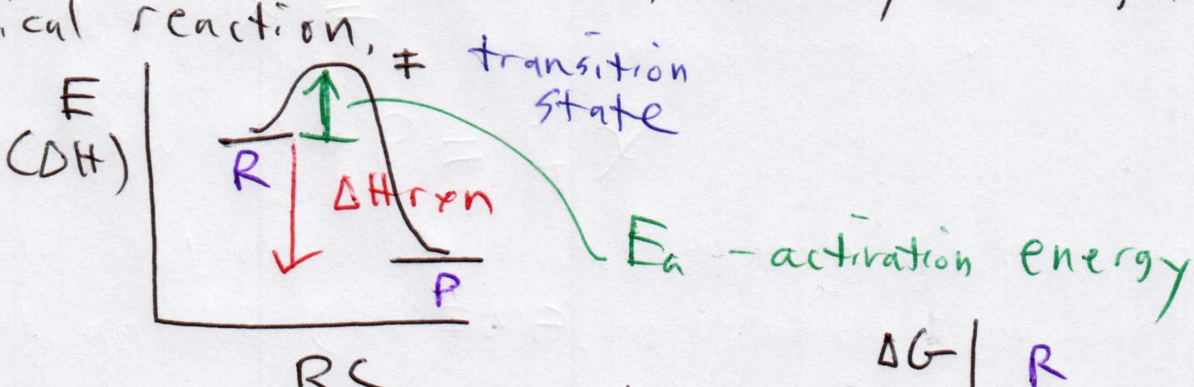
Equilibrium – "equal weight"

1) rates of forward + reverse rxns are equal (kinetic)

2) $\Delta[\text{reactants}] = \Delta[\text{products}] = 0$ (equilibrium)

3) No change in energy in the system $\Delta E = 0$ (thermodynamic)

Reaction coordinate diagram – shows the energy change that occurs in one set of reagents as they follow the most likely pathway through a chemical reaction.



Reaction progress diagram – shows the energy of a solution as reactants are converted into products