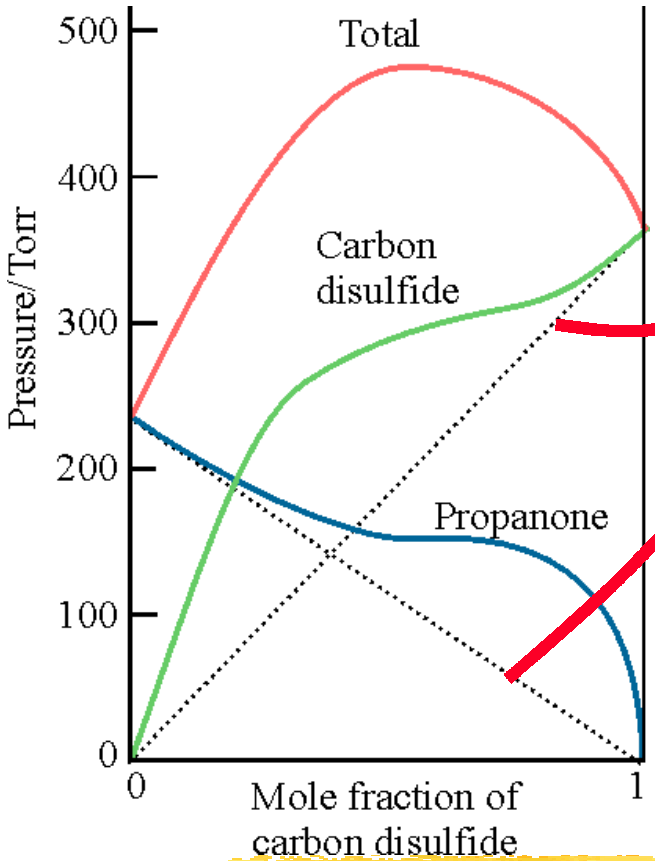
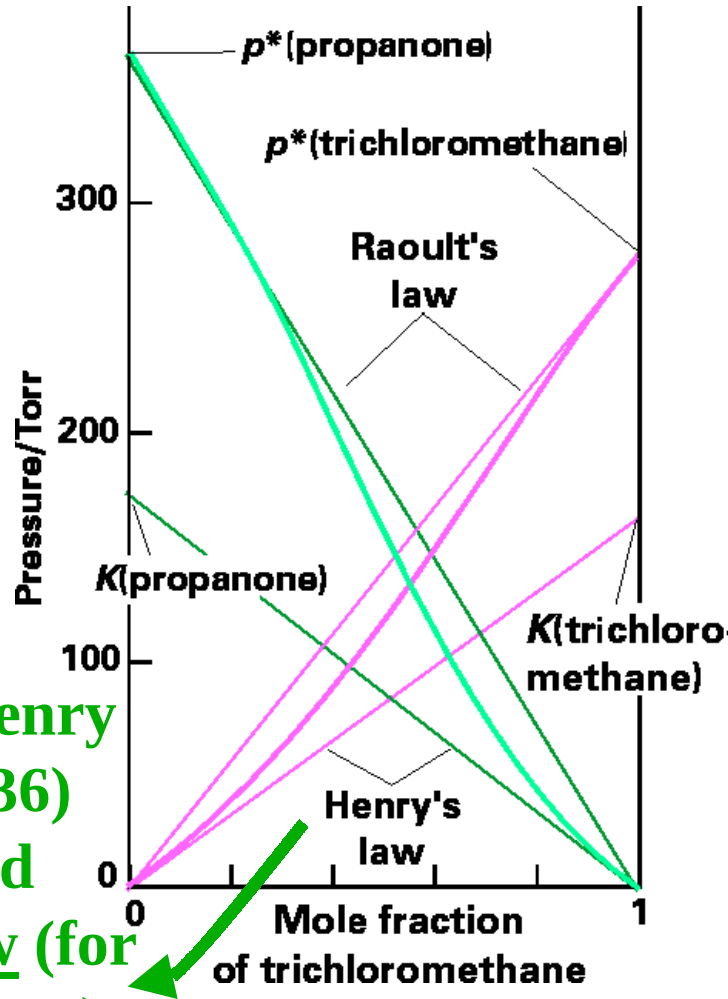
Non-ideal solutions

Strong deviations from ideality are shown by dissimilar substances



Raoult's law obeyed for a close-to-pure solvent



William Henry (1775-1836) observed <u>Henry's law</u> (for a dilute solute):

$$p_B = x_B K_B$$ **(e.g., gas solubility)**

Consequences of chemical potential changes in mixtures: Colligative properties

Freezing point depression:

$$\Delta T_f = K_f b_B$$

K_f: cryoscopic constant

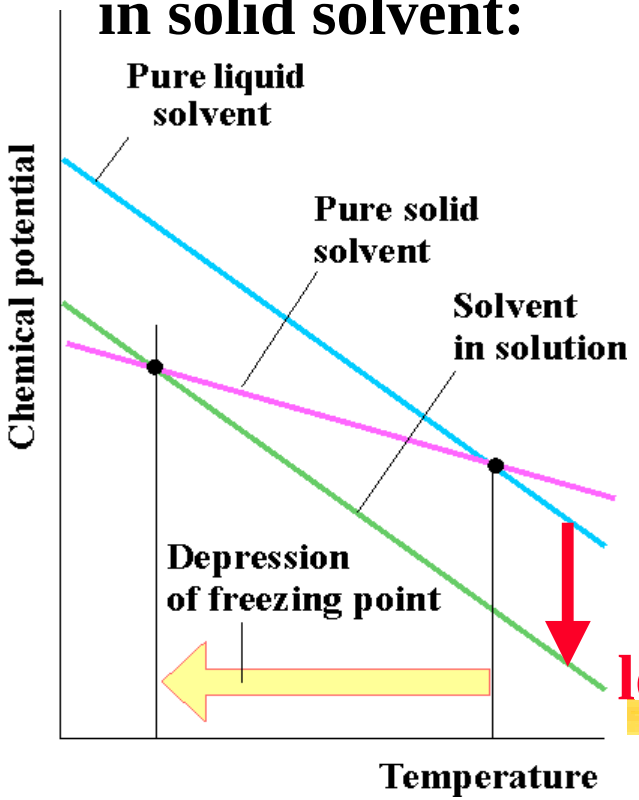
b_B: molality

Boiling point elevation:

$$\Delta T_B = K_B b_B$$

K_B: ebullioscopic constant

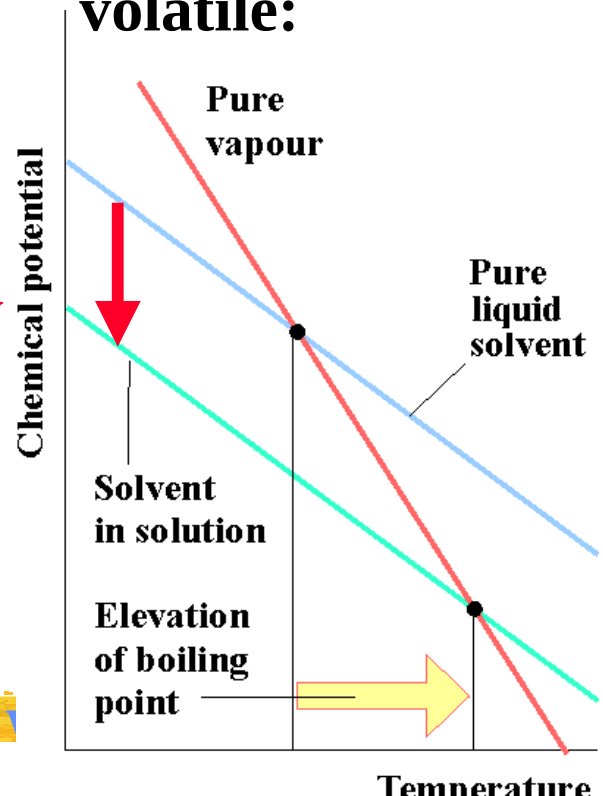
Solute is insoluble in solid solvent:



Chemical Potential lowered by solute

Chemical Potential lowered by solute

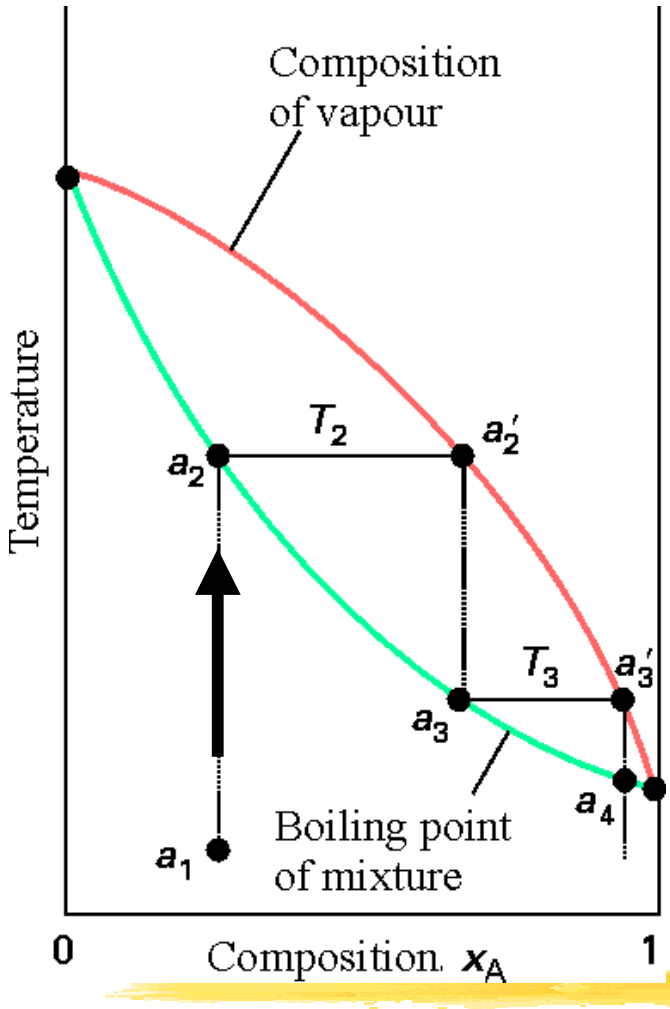
Solute is not volatile:



Nils

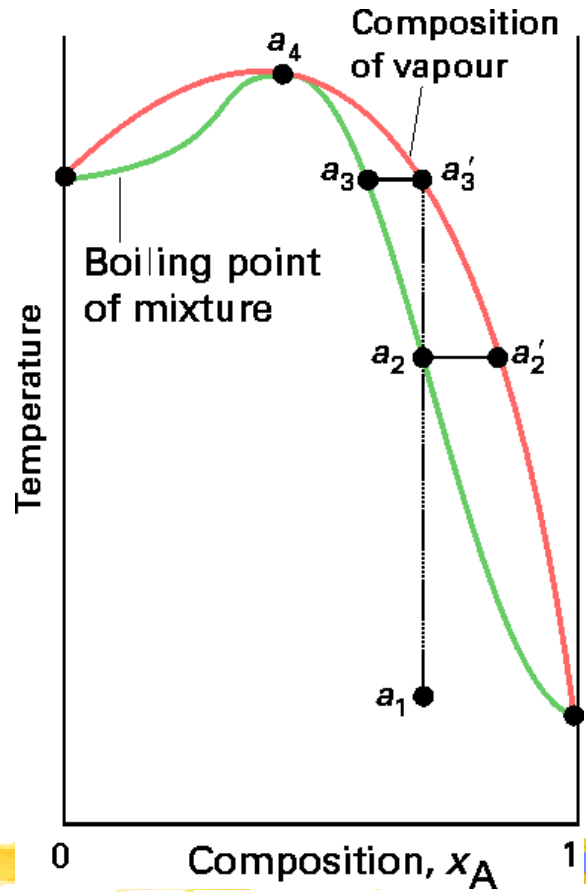
Finally, as promised: Whisky distillery

Fractional distillation:



Non-ideal mixtures

High-boiling azeotrope, e.g., nitric acid/water



Low-boiling azeotrope, e.g., ethanol/water