



has LDF's & hydrogen bonding  
 Alcohol Family

January 20, 2020

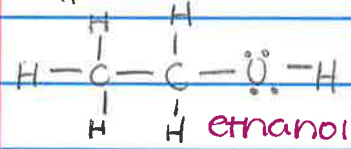


bp +65°C

solubility in water

Miscible  
 ↳ ∞ dissolving

methanol



+78°C

Miscible

ethanol

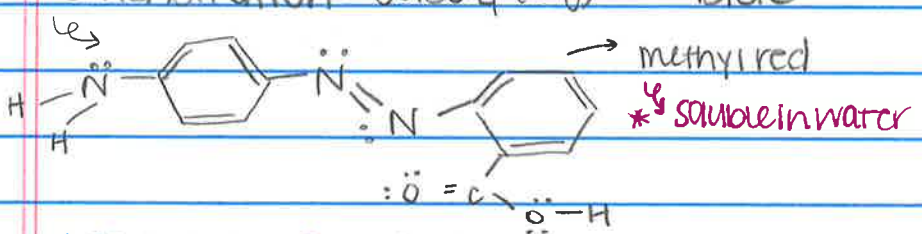
CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH propanol miscible

CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH butanol 73g/L

(C<sub>5</sub>H<sub>11</sub>OH) ← CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH pentanol 22g/L

hexanol 5.9g/L

Demonstration: CuSO<sub>4</sub> (aq) → blue



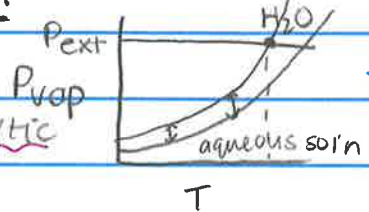
\* colligative properties:

↳ colligative properties of sol'n ONLY depend on the amount of particles in sol'n

\* vapor pressure lowering

① non-volatile, non-electrolytic solute

↳ NOT IONIC!



\* liquids = Volatile  
 \* solids = non-volatile

② Ionic sol'n

③ Volatile solute & solvent

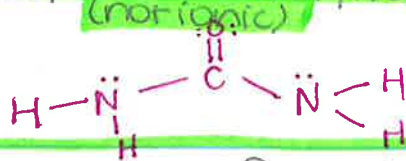
\* Freezing point lowering

\* Boiling point elevation/increases

\* Osmotic pressure

#1 \*non-volatile, non-electrolytic solute (not ionic)

ex: urea  
 vapor pressure of sol'n



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$$P_{\text{sol'n}} = X_{\text{solvent}} * P_{\text{solvent}}$$

→ suppose 57g urea (mm wt 60.1g/mol) are dissolved in 100 mL H<sub>2</sub>O (d = 0.997 g/mL) what is X<sub>H<sub>2</sub>O</sub>? what is P<sub>sol'n</sub> if P<sub>H<sub>2</sub>O</sub> = 19.5 mmHg at 22°C?

urea	$\frac{m}{57g}$	$\frac{n}{0.95}$	X <sub>H<sub>2</sub>O</sub> = 0.85
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H <sub>2</sub> O	99.7g	5.54	P <sub>sol'n</sub> = 16.6 mmHg
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#2 \*ionic solutions (non-vol)

$$P_{\text{sol'n}} = X_{\text{solvent}} * P_{\text{solvent}}$$



0.10 molal Na<sub>2</sub>SO<sub>4</sub>(aq)

\* makes 3 particles

0.20 molal Na<sup>+</sup>  
 0.10 molal SO<sub>4</sub><sup>2-</sup>  
 0.30 molal particles

@ 22°C

Na <sub>2</sub> SO <sub>4</sub>		0.10 mol
H <sub>2</sub> O	1000g	0.30 mol
		55.6 moles H <sub>2</sub> O

$$X_{\text{H}_2\text{O}} = \frac{n_{\text{H}_2\text{O}}}{n_{\text{particles}} + n_{\text{H}_2\text{O}}} = \frac{55.6}{55.6 + 0.30} = 0.995$$

$$= 0.995 * 19.5 \text{ mmHg}$$