

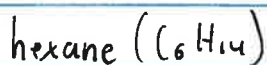
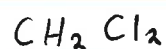
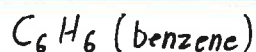
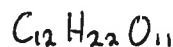
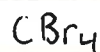
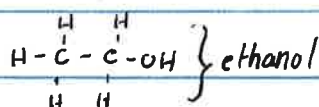
Today Jan 16 : Sections 12.1-12.3

Problem club with Al: starts 1/22 6-7:30 Epply 107

Solution = solvent + solute

(usually liquids)

solids, liquids, gases



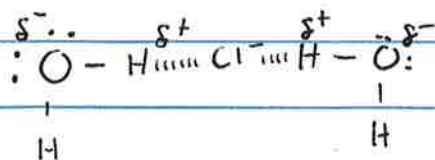
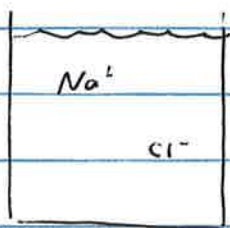
What sorts of solutes dissolve in water?

* ionics if they are soluble (CH₄ solubility rules)



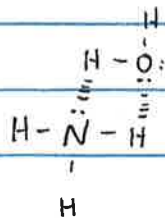
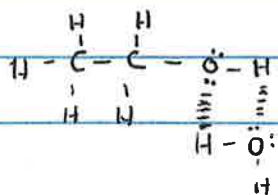
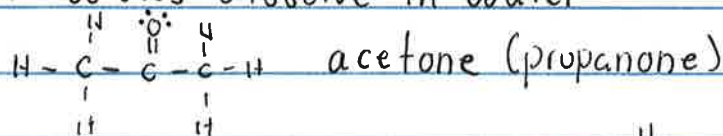
* All ionics that dissolve dissociate

100% into ions in water (H₂O)

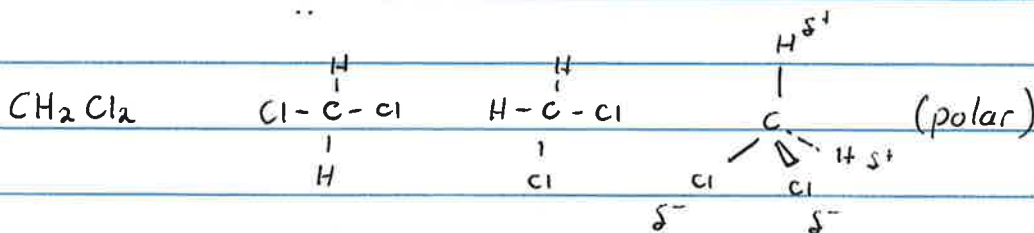
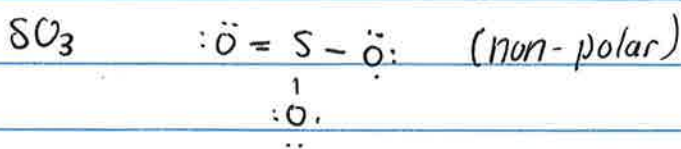
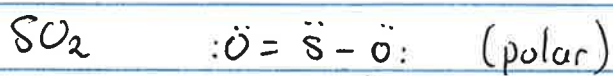
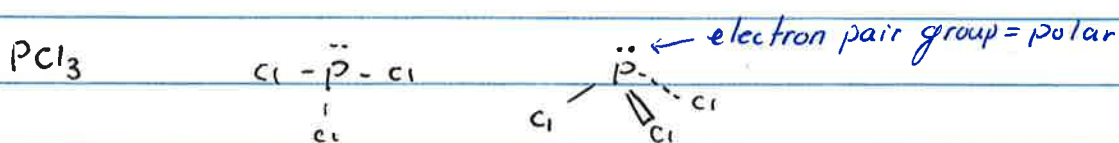
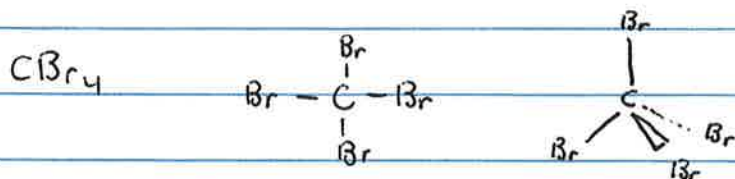


ion-dipole interaction

* polar solutes dissolve in water



* non-polar solutes are usually not soluble in water
 ↳ since non-polar solutes only have LDF



Solution concentration

Molarity = $\frac{n_{\text{solute}}}{V_{\text{solution(L)}}$



Calculate the molarity of a solution made by dissolving 95g NH_4NO_3 in enough water to make 250.00mL.

$\frac{95\text{g } \text{NH}_4\text{NO}_3}{80.043\text{g}} \times \frac{\text{mol}}{\text{mol}} = 1.19\text{mol } \text{NH}_4\text{NO}_3$

$M = \frac{1.19\text{mol}}{.25\text{L}} = \boxed{4.75\text{ mol/L}}$

mole fraction, X_{sol}

$$X_{\text{solute}} = \frac{n_{\text{solute}}}{n_{\text{solute}} + n_{\text{solvent}}}$$

$$X_{\text{solute}} + X_{\text{solvent}} = 1$$

mass percent

$$\text{mass \%} = 100\% \times \frac{m_{\text{solute}}}{\underbrace{m_{\text{solvent}} + m_{\text{solute}}}_{m_{\text{solution}}}}$$

$$\text{molality} = \frac{n_{\text{solute}}}{m_{\text{solvent}} (\text{kg})}$$

		$\text{MM} (\text{g/mol})$	m	n
solute	NH_4NO_3	80.043	54.7g	0.68 mol
solvent	H_2O	18.01	85.0g	3.22 mol

$$\text{Calculate } X_{\text{NH}_4\text{NO}_3} = \frac{\cancel{77} 0.68}{3.22 + 0.68} = \boxed{0.176}$$

$$\text{mass \%} = \frac{54.7\text{g}}{85.0\text{g} + 54.7\text{g}} \times 100\% = \boxed{39.2\% \text{ NH}_4\text{NO}_3}$$

$$\text{Molality} = \frac{0.68\text{mol}}{0.085\text{kg}} = \boxed{\frac{8 \text{ mol NH}_4\text{NO}_3}{\text{kg H}_2\text{O}}}$$

for... suppose 54.7g NH_4NO_3 is dissolved in 85.0g H_2O

- Given a 44.4 mass % NH_4NO_3 solution, calculate the molality of the solution.

	<u>MM</u>	<u>m</u>	<u>n</u>
NH_4NO_3	80.043	44.4 g	.55 mol
H_2O	18.01	55.6 g	3.09 mol

$$\text{molality} = \frac{0.55 \text{ mol } \text{NH}_4\text{NO}_3}{0.0556 \text{ kg } \text{H}_2\text{O}} = 9.89 \text{ molal}$$

- What is the molality of a solution that has

$$X_{\text{NH}_4\text{NO}_3} = 0.25$$

	<u>MM</u>	<u>m</u>	<u>n</u>
NH_4NO_3	80.043		0.25 mol
H_2O	18.01		0.75 mol