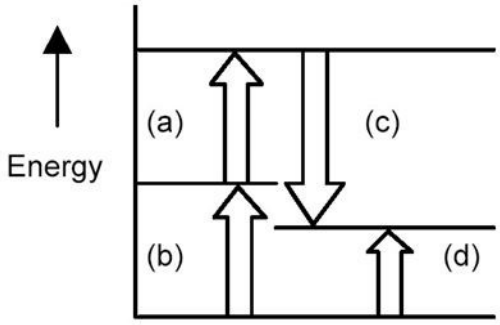
CHM 1220-Dang **Chapter 13-Post Questions** **Name**

1. Using intermolecular forces to explain why isn't pentanol ($CH_3CH_2CH_2CH_2CH_2OH$) very soluble in water?

2. Arrows in the energy diagram below represent enthalpy changes occurring in the endothermic formation of a solution:

ΔH_{soln} = enthalpy of solution
$\Delta H_{solute\text{-}solute}$ = enthalpy change involving solute-solute interactions
$\Delta H_{solute\text{-}solvent}$ = enthalpy change involving solute-solvent interactions
$\Delta H_{solvent\text{-}solvent}$ = enthalpy change involving solvent-solvent interactions



a. Which arrow represents $\Delta H_{solute\text{-}solvent}$?

b. Which arrows represent $\Delta H_{solute\text{-}solute}$ and $\Delta H_{solvent\text{-}solvent}$?

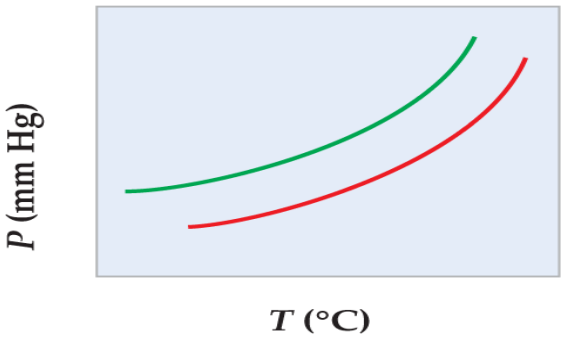
c. Which arrow represents ΔH_{soln}? Determine whether ΔH_{soln} is endothermic or exothermic. Explain why.

Fill in the blanks

3. Freezing point depression, boiling point elevation, vapor pressure lowering, and osmotic pressure are examples of _____ properties, which depend on the amount but not the chemical identity of dissolved particles.
4. The solubility of a gas in a liquid is greatest at _____ pressures and _____ temperatures.
5. If dissociation of $MgCl_2$ in water were 100%, the van't Hoff factor would be _____; however, for real solutions the van't Hoff factor for $MgCl_2$ is _____ (greater than, less than) this value.

6. Rank the following aqueous solutions from lowest to highest freezing point: 0.10 *m* $FeCl_3$, 0.30 *m* glucose ($C_6H_{12}O_6$) and 0.15 *m* $CaCl_2$. Assume complete dissociation.

7. The following diagram shows a close-up view of part of the vapor-pressure curves for a solvent (red curve) and a solution of the solvent with a second liquid (green curve). Is the second liquid more volatile or less volatile than the solvent?



8. How does a solution of two volatile components with strong solute-solvent attractions deviate from Raoult's law? Why?

9. An unknown white powder is found on the table at a crime scene and the suspect claims that it is table sugar (sucrose, $C_{12}H_{22}O_{11}$). A forensic chemist dissolves 0.512 g of the unknown white powder in enough water to produce 100.0 mL of solution. The osmotic pressure is measured at 25 °C and found to be 278 mm Hg. Does the osmotic pressure measurement support the claim that the powder is sucrose?