

Chem1403 Worksheet  
Colligative Properties Problems

1. What is the vapor pressure of 450.0g of water when 68.0g of galactose ( $C_6H_{12}O_6$ ) is added? The vapor pressure of water at room temperature is 23.8 torr.
2. About 10.56g Omeprazole ( $C_{17}H_{19}N_3O_3S$ ), a nonvolatile solute, was added to 50.0 g of ethyl acetate ( $C_4H_8O_2$ ) for analysis. The vapor pressure of this solution is found to be 89.02 torr. Calculate the initial vapor pressure of ethyl acetate before adding in Omeprazole
3. An unknown solid was added to 100.0g of acetonitrile and decreased the solvent's vapor pressure to 89.05 torr. Calculate the number mols of the unknown if the initial vapor pressure of acetonitrile is 97.51 torrs.
4. NaCl was added to water to increase its boiling point. After NaCl, the boiling point of pure water increased to 102.5°C. If  $k_{bp}$  of water is .5121°C/m, what is the molality of the salt solution?
5. A normal conditions 1.78g of CBD ( $C_{21}H_{30}O_2$ ) was added to 400.0g of benzene, raising the boiling point to 82.1°C. Calculate  $k_{bp}$  for benzene, knowing its normal boiling point is 80.1°C
6. What is the change in freezing point for an aqueous solution of 4.00m of  $K_2SO_4$ ? Given  $k_f$  for water is 1.86°C/m
7. The melting point of pure benzene is 278.70 K and  $K_f = 4.90$  K/m. When 5.83 g of an unknown solute is added to 50.0g of benzene, the freezing point of the solution is 272.4 K. Determine the molecular weight of the unknown.
8. What is the osmotic pressure of a solution prepared by dissolving 0.80g of cocaine ( $C_{17}H_{21}NO_4$ ) into water to make 16mL of solution at 25°C.
9. What is the molar mass of an unknown solid if 0.260g of the unknown solid was dissolved in 50.0g of water at 30.0°C and resulted in an osmotic pressure of 2.18 atm.