1.   Fill in the blanks using the following species: (1 point each)

MgO, $LiCl$, NH_3, $CHCl_3$, $Kr(g)$, $Mg^{2+}(aq)$

     a.   Which species will have no appreciable intermolecular forces?   __Kr__

     b.   Which species will exhibit hydrogen bonding in the liquid state?   __NH$_3$__

     c.   Which species will have the highest melting point?   __MgO__

     d.   Which has the lowest normal boiling point?   __Kr__

     e.   Will species has a solvent and solute?   __Mg^{2+}(aq)__

2.   The molar enthalpy of vaporization for 2-pentanol is 46.26 kJ/mol at 71.0 ˚C, and the density is 0.9884 g/cm^3. How much energy is required to evaporate 2.25 L of 2-pentanol? (5 points)

1170 kJ

3.   A quantity (161 mmol, where 1 mmol = 10^{-3} mol) of a nonvolatile solute is dissolved in 0.101 kg of benzene (C_6H_6). The vapor pressure of pure benzene at 27 °C is 115.8 mm Hg. Find the mole fraction of the solute and the vapor pressure of the solution at 27 °C. (5 points)

χ(solute) = 0.111
VP = 103 mm Hg

4.   Which will generate the higher osmotic pressure at 298 K: 1 L of a 0.250 M cesium sulfate solution or 1 L of a 0.220 M phosphoric acid? Explain your reasoning, calculate the osmotic pressure for both solutions and assume 100% dissociation into ions. (5 points)

for Cs$_2$SO$_4$: π = 18.3 atm
for H$_2$PO$_4$: π = 21.5 atm
H$_3$PO$_4$ is higher!