**Quiz 10**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Suppose 651 g of ethylene glycol, HOCH2CH2OH, is dissolved in 1.50 kg of water. What is the vapor pressure of the water over the solution at 90 °C? The vapor pressure of pure water at 90 °C is 525.8 mm Hg. Assume ideal behavior for the solution (10 points).

$$n\_{water}=1.50 kg H\_{2}O×\frac{1000 g}{1 kg}×\frac{1 mol H\_{2}O}{18.015 g H\_{2}O}=83.3 mol H\_{2}O$$

$$n\_{glycol}=651 g HOCH\_{2}CH\_{2}OH×\frac{1 mol HOCH\_{2}CH\_{2}OH}{62.068 g HOCH\_{2}CH\_{2}OH}=10.5 mol HOCH\_{2}CH\_{2}OH$$

$$χ\_{water}=\frac{n\_{solvent}}{n\_{solution}}=\frac{n\_{water}}{n\_{water}+n\_{glycol}}$$

$$χ\_{water}=\frac{83.3 mol}{83.3 mol+10.5 mol}=\frac{83.3 mol}{93.8 mol}=0.888$$

$$P\_{solution}=χ\_{solvent}P\_{solvent}^{°}$$

$$P\_{solution}=\left(0.888\right)\left(525.8 mmHg\right)=467 mm Hg$$

$$∆P\_{water}=P\_{water}^{°}-P\_{water}=525.8 mm Hg-467 mm Hg=59 mm Hg$$

1. Why does ice float on water (4 points)?

Water molecules in the solid form are held in a crystal pattern that has voids between the molecules. Since the hydrogen bonds in the liquid water get frozen in place in solid water also known as ice. Therefore, ice (0.92 g/mL) has a lower density than water (1.00 g/mL) and floats on it.

1. How are network solids, such as diamond, C, and quartz, SiO2, distinguished from molecular crystals such as I2 (4 points)?

Network solids have very high melting points and no discrete molecules, but atoms that are covalently bonded to each other to form a huge molecule. Whereas molecular crystals are made up of molecules that are held together by intermolecular forces and have low melting points.

1. Complete the following sentences (3 points):
	1. The topic/experiment/chapter in chemistry 141 that I found the most challenging was\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because…