**Quiz 11**

# 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. Is this week’s experiment qualitative or quantitative (1 point)? \_\_\_\_\_qualitative\_\_\_\_\_\_\_\_\_\_\_
2. Dimethylglyoxime [DMG, (CH3CNOH)2] is used as a reagent to precipitate nickel ion. Assume that 53.0 g of DMG has been dissolved in 525 g of ethanol (C2H5OH) (16 points).
	1. What is the mole fraction of DMG?

$$53.0 g (CH\_{3}CNOH)\_{2}×\frac{ 1 mol (CH\_{3}CNOH)\_{2}}{116.12 g (CH\_{3}CNOH)\_{2}}=0.456524389 mol (CH\_{3}CNOH)\_{2} ≈0.456 mol (CH\_{3}CNOH)\_{2}$$

$$525 g C\_{2}H\_{5}OH×\frac{1 mol C\_{2}H\_{5}OH}{46.069 g C\_{2}H\_{5}OH}=11.39594955 mol C\_{2}H\_{5}OH ≈11.4 mol C\_{2}H\_{5}OH$$

$$χ\_{DMG}=\frac{n\_{DMG}}{n\_{total}}=\frac{0.456524389 mol }{11.39594955 mol+0.456524389 mol }=\frac{0.456524389 mol }{11.85247394 mol }=0.038517224≈0.0385$$

* 1. What is the molality of the solution?

$$m=\frac{n\_{solute}}{kg\_{solvent}}=\frac{0.456524389 mol (CH\_{3}CNOH)\_{2}}{525 g C\_{2}H\_{5}OH}×\frac{1000 g}{1 kg}=0.869379788 m≈0.870 m $$

* 1. What is the vapor pressure of the ethanol over the solution at ethanol’s normal boiling point of 78.4 °C?

$$P\_{solution}=iχ\_{solvent}P\_{solvent}^{°}=(1-χ\_{solute})P\_{solvent}^{°}$$

$$P\_{solution}=(1)(1-0.0385)(760 torr)$$

$$P\_{solution}=0.961\left(760 torr\right)=730.7 torr $$

* 1. What is the boiling point of the solution? (DMG does not produce ions in solution.) (Kb for ethanol is + 1.22 °C/*m*).

$$∆T\_{b}=ik\_{b}m=\left(1\right)\left(1.22 \frac{℃}{m}\right)\left(0.870 m \right)=1.0614 ℃$$

$$∆T\_{b}=T\_{b}-T\_{b}^{°}⇒T\_{b}=∆T\_{b}+T\_{b}^{°}=1.0614 ℃+78.4 ℃=79.4614 ℃≈79.5 ℃$$

1. Complete the following sentences (3 points):
	1. My favorite experiment/chapter/topic in chemistry 141 was\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. One piece of advice that I would give to a beginning chemistry 141 student is…