**Exercise 8: Glass Basics**

 *Chem 6614 Chemical Instrumentation*

**8.0. List three unique physical/chemical characteristics of the glass phase**

**a)**

**b)**

**c)**

**8.1. List the three components of a glass according to classical glass structure theory:**

**a)**

**b)**

**c)**

**8.2. What are specific chemical examples of the above general component types ? (fill-in in order**

 **as you answered in question 2 above)**

**a) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ c) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8.3a. Which is more transparent and less opaque: glassy silica (SiO2) or crystalline silica (quartz)**

 **{circle one}**

**8.3b. Provide a brief rationale for the answer you gave in 8.3a.**

**8.4) Name two general ways to alter the physical properties of glass.**

 **a)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **b) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8.5. Consider the three widely differing glasses below:**

 ***WATER GLASS SILICA PYREX***

**a)** Which of the glasses above has almost no `island’ structure ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**b)** Which of the glasses above contains no modifier ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(may be more than one)

**8.6.** Predict whether glassy silica will be more or less dense than crystalline silica (quartz) and justify your prediction based on the simple model presented in class to describe the difference between glass and crystal.

8.7 T/F

1. Changing the quench rate of a fixed glass composition changes the glass properties T F
2. Glass composition must follow strict chemical stoichiometry ratios T F
3. There are no phase boundaries in a true glass T F
4. Adding more flux lowers the melting point of any glass composition T F
5. Modifier `heals’/rejoins the island formations created by formers like SiO2 T F