Chemistry 121 Name:

Sample Exam 1 (chapters 1, 2 and 4)

Open book, notes, handouts, homework; no collaboration, 50 minutes. 50 points possible.

1. (2 points) A roll of 50 pennies weighs 135.356 grams. How many **significant figures** are in the answer to "how much does each penny weigh"?

2. (2 points) A roll of 50 pennies weighs 135.356 grams and occupies a volume of 17.35 mL. How many **significant figures** are in the answer to "what is the density of a roll of pennies"?

3. (2 points) Which of the following substances is a **mixture**? Circle as many as you must.

a. water b. milk c. ethanol d. 2 M $CuSO_4$

4. (5 points) A lead atom weighs 3.4×10^{-23} g. Lead has a density of 11.3 g/cm^3. **How many atoms** are in a sample of lead that has a volume of 2.00 cm^3? Show your work, and watch significant figures!

5. (2 points) Boron-11 (^{11}B) has _____ protons and _____ electrons

6. (2 points) Write the **electronic configuration** of neutral boron-11. You may choose any representation you wish; just be clear.

7. (5 points) The element **boron** (atomic mass = 10.811) has two isotopes: ^{10}B with a mass of 10.013 amu and ^{11}B with an atomic mass of X amu. Determine X. Show your work and watch significant figures.

8. (2 points each) Provide the proper **systematic name** or the proper **chemical formula** as appropriate for the compounds below.

a. tin (II) chloride (found in toothpaste)

b. hydrofluoric acid (used to clean computer chips)

c. CCl_4 (a banned dry-cleaning fluid)

d. $Ca_3(PO_4)_2$ (a nutritional supplement)

9. Ozone has the formula O_3. It is a gas that absorbs dangerous ultraviolet (UV) radiation from the Sun and is usually found high in the atmosphere.

a. (2 points) Draw an acceptable **Lewis (electron) dot structure**;

b. (2 points) Comment on its **molecular shape** (and *explain* how you derived that);

c. (2 points) Is this molecule **polar**? *Explain* your answer.

d. (extra credit — 2 points) Does ozone have **resonance structures**? If so, draw it. If not, explain why it is impossible.

10. In a different CHE 121 section, the students performed Lab 1 with a slightly different goal: they measured the mass *and* the volume of water in the glassware. From that information, they figured out the density of water and compared that to the Frostburg University water density website.

volume-measuring device	100 mL beaker	10 mL graduated cylinder	10 mL volumetric pipet
density of water determined from the measured volume and mass	2	0.9988	0.99643
Percent error between the calculated density and the Frostburg U. density	100%	0.06%	0.18%

a. (3 points) Which piece of glassware is the most **precise**, according to this group? Explain your answer!

b. (3 points) Which piece of glassware is the most **accurate**, according to this group? Explain your answer!