Chemistry

Chapter 5 Study Questions

1. Express the following numbers or answers in scientific notation:
   a) 650 (2 sig fig) b) 0.0005 (1 sig fig) c) 207,000 (3 sig fig)
   d) $(5.0 \times 10^3) \times (2.0 \times 10^2)$ e) $(3.0 \times 10^2) \div (6.0 \times 10^{-3})$

2. For each of the following, indicate the metric unit and a device used to measure it.
   a) volume b) mass c) length

3. Indicate the number of significant figures in the following numbers:
   a) 2,348 b) 7.0001 c) 0.0023 d) 24,500 e) 0.1060

4. Perform the following operations and express the answers in significant figures:
   a) $1.24 \times 8.2 =$ b) $6.78 - 3.3 =$ c) $9.999 + 0.22 =$ d) $(5.67 \times 10^3) \times (2.1 \times 10^{-2})$

5. Bozo determined the density of a sample of aluminum. For his sample, he found the volume was 0.350 cm^3 and the mass was 0.822 g.
   a) Calculate the density of aluminum from Bozo's data.
   b) The actual density of aluminum is 2.70 g/cm^3. Calculate Bozo's percent accuracy error.

NOTE: *Use conversion factors* to answer the problems below. Show all work. Answers must be in <u>significant figures</u> and include units. Use the table on the inside back cover of the textbook as needed. (Or you may use the Table handed out in class.)

6. Calculate the mass in milligrams of a person with a mass of 50.0 kg.

7. Find the mass in pounds (lbs) of a 275-gram sample of sugar.

8. Find the number of cm in 0.286 miles.

9. Find the volume in microliters of 11.8 kg of iron. The density of iron is 7.87 g/cm^3.

10. Tungsten is a very dense metal, with a density of 19.3 g/cm^3. Convert the density of tungsten to pounds/quart.

11. The volume of a sample is recorded from three different containers as indicated below. The "true" value for the volume is exactly 61.2 mL.

Measurement	**Container A**	**Container B**	**Container C**
1	63.40 mL	61 mL	59 mL
2	63.48 mL	60 mL	59 mL
3	63.42 mL	62 mL	59 mL

   a) Which of the three containers is the most precise?
   b) Which container is the most accurate?
   c) Which container(s) show a systematic error?

12. (OPTIONAL) Assuming each ant is 5.0 mm long, how many ants would it take to make a line, single file, from one end to the other of a 100-yard football field? (2 sig fig)

Summary of Chapter 5: Measurements and Calculations

qualitative vs. quantitative observations
scientific notation
metric units: gram, liter, meter
metric prefixes: nano, micro, milli, centi, kilo
measuring devices: balance, graduated cylinder
significant figures
recording, counting and in arithmetic
exact quantities
accuracy & precision
percent accuracy error: $\%\ accuracy error = \frac{|true value - measured value|}{true value}\ x\ 100\%$
problem solving using conversion factors (dimensional analysis)
density