Name:_____ Date: _____

Working with Formulas

Using Reference Table T, find the correct formula and solve each of the following problems. Some problems will need values to be converted to the required unit for the formula.

Density must be in grams per milliliter or centimeters cubed. (g/mL or g/cm³)

Be sure to round for significant figures and include units in all of your answers!

When using percent error, the 100 is a fixed value and considered to have an infinite number of significant figures. Do not use the "100" when rounding the final answer using significant figures. Base your rounding off of the given values from the problem.

1. What is the volume of a liquid with a density of 1.500 g/ml and a mass of 78.00 g?

4 SF 4 SF

$d = \frac{m}{V}$; $\frac{1.500}{1} = \frac{78.00}{V}$; $\frac{1.500V}{1.500} = \frac{78.00}{1.500}$

$V = 52.00\ mL$

2. What is the density of an object with a mass of 34.0 g and a volume of 0.013 L?

$d = \frac{m}{V}$

1L = 1000 mL; .013L = 13 mL

$\frac{34.0\ g}{13\ mL} = 2.61538\ g/mL$

$2.6\ g/mL$

3. During a lab experiment a student has a precious metal sample and must determine the metal's identity. The student knows that the metal is less reactive than hydrogen on reference Table J. The student finds the mass of the sample to be 255.15 g and the volume it occupies to be 24.3 cm³.

   a. Based on **Reference Table J**, what are the possible metals the student could have?

   Cu, Ag, Au

   b. From the students measured data for mass and volume, find the density of the metal. Be sure to round the answer to the correct number of significant figures.

   $d = \frac{m}{V} = \frac{255.15\ g}{24.3\ cm^3} = 10.5\ g/cm^3$

   c. Using **Reference Table S** and the density of the metal, please determine the identity of the metal.

   Ag: $10.5\ g/cm^3$
   Au: $19.3\ g/cm^3$
   Cu: $8.96\ g/cm^3$

   Silver; Ag

   d. Based upon your answer to part b and part c, how close was the students measured value of density of the metal to the actual value listed in Table S.

   The values were the same

4. The actual mass of a penny is 2.67 g, but it was measured at 2.55 g. Determine the percent error. Round your answer to the correct number of significant figures.

av mv

$$\frac{(2.55\,g - 2.67\,g)}{2.67\,g} \times 100 = |-4.49\%|$$

5. The density of Lead is 11.3 g/ml. If a sample of Lead has a mass of 91.0 g, how much space does the Lead occupy?

$$D = \frac{m}{V};\quad 11.3 = \frac{91.0}{V};\quad \frac{V\,11.3}{11.3} = \frac{91.0}{11.3};\quad V = 8.05\,ml$$

6. The amount of heat released when 1 mole of CO2 forms is 393.5 kJ/mol. In a lab the value of heat released was measured at 378.2 kJ/mol. Determine the amount error in the measured value.

av mv

$$\frac{(378.2 - 393.5)}{393.5} \times 100 = |-3.888\%|$$

7. A student finished running a mile in gym class and takes their pulse. Their heart rate is 132 beats per minute (beats/min). How many beats per second is this?

3 sf

$$132\,\frac{beats}{min}\left(\frac{1\,min}{60\,s}\right) = 2.20\,\frac{beats}{s} \qquad \frac{beat}{min}$$

8. A sample of water has a volume of 256.00 L.

a. How many **milliliters** is this?

$$256.00\,L\left(\frac{1000\,mL}{1\,L}\right) = 256{,}000\,mL$$

256.00

b. If 1g=1ml, how many **milligrams** are contained in the 256.00 L sample of water?

$$256{,}000\,mL\left(\frac{1\,g}{1\,mL}\right) = 256{,}000\,g$$

9. What is the mass of an object with a volume of 58.0 mL and a density of 2.45 g/mL?

$$d = \frac{m}{V};\quad \frac{2.45}{1} = \frac{m}{58.0};\quad m = 2.45(58.0)$$

$$m = 142.1\,g$$

$$\boxed{m = 142\,g}$$