Che 111: Chapter 8 Practice Problems Key

1. The first step in the unit analysis procedure is to identify the unit for the value we want to calculate. We write this on the ___left____ side of an equals sign. Next, we identify the ___given value_____ that we will convert into the desired value, and we write it on the other side of the equals sign.

2. The number of significant figures, which is equal to the number of meaningful digits in a value, reflects the degree of ___uncertainty__ in the value.

3. Anything that can be read as ___a ratio__ can be used as a unit analysis conversion factor.

4. The average human body contains 5.2 liters of blood. What is this volume in gallons?

$$5.2\ \text{L}\left(\frac{1\ \text{gal}}{3.785\ \text{L}}\right) = 1.4\ \text{gallons}$$

5. The moon orbits the sun with a velocity of 2.2×10^4 miles per hour. What is this velocity in meters per second?

$$\frac{2.2 \times 10^4\ \text{miles}}{1\ \text{hr}}\left(\frac{1.609\ \text{km}}{1\ \text{mile}}\right)\left(\frac{1000\ \text{m}}{1\ \text{km}}\right)\left(\frac{1\ \text{hr}}{60\ \text{min}}\right)\left(\frac{1\ \text{min}}{60\ \text{sec}}\right) = 9.8 \times 10^3\ \text{m/s}$$

6. When one gram of methane gas, $CH_4(g)$, is burned, 55.5 kJ of heat are released. How many pounds of methane gas must be burned to release 2.578×10^3 kJ of heat?

$$2.578 \times 10^3 \text{ kJ} \left(\frac{1 \text{ g } CH_4}{55.5 \text{ kJ}}\right)\left(\frac{1 \text{ lb}}{453.6 \text{ g}}\right) = 0.1024 \text{ lb } CH_4$$

7. Normal blood contains from 3.3 to 5.1 mg of amino acids per 100 mL of blood. If a person has 5.33 L of blood and 4.784 mg of amino acids per 100 mL of blood, how many grams of amino acids does the blood contain?

$$5.33 \text{ L} \left(\frac{1000 \text{ mL}}{1 \text{ L}}\right)\left(\frac{4.784 \text{ mg aa}}{100 \text{ mL}}\right)\left(\frac{1 \text{ g}}{1000 \text{ mg}}\right) = 0.255 \text{ g amino acids}$$

8. Table salt, sodium chloride, melts at 801 °C. What is this temperature in °F? ….in K?

$$801\ ^{\circ}\text{C} \left(\frac{1.8\ ^{\circ}\text{F}}{1\ ^{\circ}\text{C}}\right) + 32\ ^{\circ}\text{F} = 1470\ ^{\circ}\text{F}$$

$$801\ ^{\circ}\text{C} + 273.15 \text{ K} = 1074 \text{ K}$$