Chem 121: Winter 2011
Quiz 2

Show all your work, and PAY ATTENTION TO SIGNIFICANT FIGURES in each of your calculations. If anything is unclear, please ask. **CELL PHONES OFF!!!**

1. [16 points] Convert the following:

   \[ 1449 \text{ cm}^3 \frac{(1 \text{ in}^3)}{(2.54 \text{ cm})^3} \frac{(1 \text{ ft}^3)}{(12^2 \text{ ft}^2)} = 0.05117 \text{ ft}^3 \]

   \[ 0.0070 \mu \text{g} \frac{(10^{-6} \text{ g})}{(1 \mu \text{g})} \frac{(1 \text{ cg})}{(0.01 \text{ g})} = 7.0 \times 10^{-7} \text{ cg} \]

   \[ 13.2 \text{ mL/cm}^2 \frac{(0.001 \text{ L})}{(1 \text{ mL})} \frac{(1 \text{ cm}^3)}{0.001 \text{ m}^3} = 13.2 \frac{\text{ L}}{\text{ m}^2} \]

2. [8 pts] The density of gasoline is 0.780 g/mL. If the gas tank of a truck holds 25.0 kg of gasoline, what is the volume of this amount, in L?

   \[ 25.0 \text{ kg} \frac{(1000 \text{ g})}{(1 \text{ kg})} \frac{(1 \text{ mL})}{(0.780 \text{ g})} \frac{(0.001 \text{ L})}{(1 \text{ mL})} = 32.1 \text{ L} \]

3. [6 pts] If you run at a pace of 9.2 miles per hour, how many minutes will it take you to run a 10 km race?

   \[ 10 \text{ km} \frac{(1 \text{ mi})}{(1.609 \text{ km})} \frac{(1 \text{ hr})}{(9.2 \text{ mi})} \frac{(60 \text{ min})}{(1 \text{ hr})} = 41 \text{ min} \]

   or, 40 min
4. [8 pts] How much energy (in kJ) does your heart require to pump for 12.0 hours, if it has an average rate of 1.3 beats per second, and 1.1 cal is needed for 5 beats?

\[
12.0 \text{ h} \left( \frac{60 \text{ min}}{1 \text{ h}} \right) \left( \frac{60 \text{ s}}{1 \text{ min}} \right) \left( \frac{1.3 \text{ beats}}{\text{s}} \right) \left( \frac{11 \text{ cal}}{5 \text{ beats}} \right) \left( \frac{4.184 \text{ J}}{1 \text{ cal}} \right) \left( \frac{1 \text{ kJ}}{1000 \text{ J}} \right) = \frac{2068}{52} \text{ kJ}
\]

5. [8 pts] Temperature conversions:

Convert 500.0 K to °C.

\[
T(\circ C) = T(\text{K}) - 273.15
\]

\[
T(\circ C) = 500.0 - 273.15 = 226.9 \circ C
\]

Convert 37.8°F to K.

\[
T(\circ C) = \frac{5}{9} \left(37.8 - 32\right)
\]

\[
= \frac{5}{9} \left(5.8\right) = 3.22
\]

\[
T(\text{K}) = 3.22 + 273.15 = 276.4 \text{ K}
\]