Chem 1010-009 Homework

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5. Will the power of 10 have a *positive* or a *negative* exponent when each of the following numbers is rewritten in standard scientific notation?

   (a) 42,751 - positive

   (b) 1253 - positive

   (c) 0.002045 - negative

   (d) 0.1089 - negative

29. If you were to measure the width of this page using a ruler, and you used the ruler to the limits of precision permitted by the scale on the ruler, the last digit you would write down for the measurement would be *uncertain* no matter how careful you were. Explain.

    - Some degree of uncertainty will always exist when making observed measurements, usually due to visual estimate.

41. Consider the calculation indicated below:

$$\frac{2.21 \times 0.072333 \times 0.15}{4.995}$$

Explain why the answer to this calculation should be reported to only two significant digits.

- The item with the least amount of significant digits represents the highest precision we can estimate. Using any more than 2 significant digits wouldn't take into account the uncertainty of 2.21 or 0.15.

47. Evaluate each of the following mathematical expressions, and express the answer to the correct number of significant digits.

(a) $44.2124 + 0.81 + 7.335 = 52.38$

(b) $9.7789 + 3.3315 - 2.21 = 10.90$

(c) $0.8891 + 0.225 + 4.14 = 5.25$

(d) $(7.223 + 9.14 + 3.7795)/3.1 = 6.50$

59. Perform each of the following conversions, being sure to set up the appropriate conversion factor in each case.

(a) $12.5 \text{ in.} \times \frac{2.54 \text{ cm}}{1 \text{ in.}} = 31.8 \text{ cm}$

(b) $12.5 \text{ cm} \times \frac{1 \text{ in.}}{2.54 \text{ cm}} = 4.92 \text{ inches}$

(c) $2513 \text{ ft} \times \frac{1 \text{ mi}}{5280 \text{ ft}} = 0.4759 \text{ mi}$

(d) $4.53 \text{ ft} \times \frac{1 \text{ mi}}{5280 \text{ ft}} \times \frac{1760 \text{ yd}}{1 \text{ mi}} \times \frac{1 \text{ m}}{1.094 \text{ yd}} = 1.38 \text{ meters}$

(e) $6.52 \text{ min} \times \frac{60\text{s}}{1\text{min}} = 391 \text{ seconds}$

(f) $52.3 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.523 \text{ meters}$

(g) $4.21 \text{ m} \times \frac{1.094 \text{ yd}}{1 \text{ m}} = 4.61 \text{ yards}$

(h) $8.02 \text{ oz} \times \frac{1 \text{ lb}}{16 \text{ oz}} = 0.501 \text{ pounds}$

73. Make the following temperature conversions:

(a) 44.2 °C = 314.2 K

(b) 891 K = 618 °C

(c) -20 °C = 253 K

(d) 273.1 K = 0.1 °C

87. For the masses and volumes indicated, calculate the density in grams per cubic centimeter.

(a) mass = $452.1\,g$; volume = $292\,cm^3$
density = $1.55\,g/cm^3$

(b) mass = $0.14\,lb$; volume = $125\,mL$
density = $\frac{63.5\,g}{0.0125\,cm^3} = 5030\,g/cm^3$

(c) mass = $1.01\,kg$; volume = $1000\,cm^3$
density = $\frac{1010\,g}{1000\,cm^3} = 1\,g/cm^3$

(d) mass = $225\,mg$; volume = $2.51\,mL$
density = $\frac{0.225\,g}{0.000251\,cm^3} = 896\,g/cm^3$

- *Extra credit:* The prefix name for 10^{-4} is decimilli.
http://www.mathnstuff.com/math/spoken/here/2class/110/milli/metric.htm