CHEMISTRY 11

SIGNIFICANT DIGITS OR SIGNIFICANT FIGURES -- are used to give an idea of the degree of uncertainty in your measurement - i.e. sig. figs. are those known accurately (certain) plus one.

1. all non zero digits are significant
   examples: 234 =   6791 =   62 =

2. all zeros between non zero digits are significant
   examples: 2001 =   605 =   12301 =

3. zeros don't count if they show a decimal place or how big or how small a number is   examples: 0.0072 =   0.0145 =   1200 =

4. zeros count if they show a measurement was made
   examples: 1.50 =   86.00 =   40.0 =
   HINT: if you can *leave* the zero out when putting it in the calculator it *counts* or is *significant*.
   examples: 4.7600 =   12000 =   0.072 =
   6000 =   40 =   56.0 =   12.00 =
   430 =   0.0720 =   0.00940 =

5. if a zero is at the end and is significant, and there are zeros before it, these count   example: 40.0 =

6. when a number is expressed in scientific notation, all of the numbers count for sig figs.
   examples: 2.3×10^2 = 1.20×10^{-6} = 8.00×10^7 =

7. Rules for adding or subtracting numbers and sig figs:
   the answer should have no more decimal places than the least accurate one in the problem.
   examples: 4.9 + .372 + 2.55 =   (1 decimal place)
   64.55 - 22 = 43   (nearest whole number)
   142.32 - 4.156 + 9.12 - 2.5 =   (1 decimal place)

8. Rules for multiplying or dividing and sig figs: the answer should have the least number of significant digits as in the problem.
   examples: 0.0725 x 41 x 27.9 =   (2 sig figs)
   $\dfrac{61.93 \times 9.97 \times 41}{0.673 \times 24}$ =   (2 sig figs)
   $2.34 \times 10^{-4} \times 2.1 \times 10^2$ =   or $\times 10^{-2}$ (2 sig figs)

Scientific Notation & Sig Fig Problems

1. Express the following in scientific notation

   a) 1 240 000   _____
   b) 1 280   _____
   c) 1 000 000 000 000 000   _____
   d) 0.000 124   _____
   e) 0.000 000 210 _____

2. Expand the following numbers expressed in scientific notation

   a) 1.32×10^5 _____
   b) 2.06×10^3 _____
   c) 6.02×10^{23} _____
   d) 1.32×10^{-3} _____
   e) 3.45×10^{-6} _____

3. How many significant figures are in the following

   a) 3.67   _____   e) 6000   _____
   b) 0.770 _____   f) 0.00025   _____
   c) 42.02 _____   g) 2.00×10^{-6} _____
   d) 10.0   _____   h) 0.003570   _____

4. Round off the following to the number of sig figs indicated

   a) 2.95493   to 5 s.f. _____   to 4 s.f. _____   to 3 s.f. _____
   b) 0.0028275 to 4 s.f. _____   to 3 s.f. _____   to 2 s.f. _____
   c) 162975   to 3 s.f. _____   to 2 s.f. _____   to 1 s.f. _____
   d) 19925   to 4 s.f. _____   to 3 s.f. _____   to 2 s.f. _____

5. Calculate the following using sig fig rules & express in scientific notation when appropriate

   a) 12.3 (4.1 + 6.25) = _____   h) 4.15 (23 − 4.15) = _____

   b) 91.9 (41.3 − 34.5) = _____   i) 18.5 x (25.4 − 23.4) x 4.18 = _____

   c) 832 x 5.14 = _____   j) $(3.15 \times 10^7) \times (23.2 \times 10^{12})$ = _____

   d) 714.2 − 2.4 + 16.957 = _____   k) 0.0562 x 9.34 = _____

   e) $\dfrac{0.0932}{0.754}$ = _____   l) $\dfrac{10529 \times 731.0}{0.24}$ = _____

   f) $\dfrac{892.3}{21}$ = _____   m) $\dfrac{(7.27 \times 10^{23})(5.965 \times 10^{-12})}{3.2 \times 10^{-6}}$ = _____

   g) $\dfrac{0.0158}{3.27}$ = _____   n) $\dfrac{(2.1 \times 10^3)(1.86 \times 10^{-2})}{6.783 \times 10^8}$ = _____