REVIEW PROBLEM SET

1) Write the chemical formulas or symbols for each of the following ions.
   a) sodium ion b) oxide ion c) calcium ion d) iodide ion
   e) iron(II) ion f) copper(I) ion g) hydroxide ion h) nitrate ion
   i) sulfate ion j) phosphate ion k) carbonate ion l) ammonium ion
   m) bicarbonate ion

2) Write chemical formulas for each of the following ionic compounds.
   a) sodium sulfide b) magnesium fluoride c) aluminum oxide
   d) iron(III) chloride e) potassium sulfate f) aluminum nitrate
   g) ammonium phosphate

3) a) What is the ion charge on each atom of V in the compound V_2S_3?
   b) What is the ion charge on each P_3O_{10} group in the compound $Ca_5(P_3O_{10})_2$?

4) Balance the following chemical equation: $Cr_2O_3 + HBr \rightarrow CrBr_3 + H_2O$

5) If you have exactly one mole of $Cr(NO_3)_3$, how many grams of this compound do you have?

6) Convert each of the following to moles:
   a) 6.131 g of N b) 6.131 g of N_2 c) 6.131 g of N_2O

7) a) How many N_2O molecules are there in 6.131 g of N_2O? *(Reminder: Avogadro's constant is 6.022×10^{23} mol^{-1}.)*
   b) How many nitrogen atoms are there in 6.131 g of N_2O?

8) In 0.08157 moles of $Al(ClO_4)_3$, there are…
   a) how many moles of Al^{3+} ions?
   b) how many moles of ClO_4^- ions?
   c) how many moles of oxygen atoms?

9) If you have 285 atoms of fluorine…
   a) How many moles of fluorine atoms do you have?
   b) What is the mass of the fluorine atoms, in grams?

10) $KClO_3$ breaks down when it is heated. The chemical equation for this reaction is:

$$2\ KClO_3 \rightarrow 2\ KCl + 3\ O_2$$

   a) If 5.000 g of $KClO_3$ breaks down, how many grams of O_2 will be formed?
   b) If 2.000 g of O_2 are formed, how many grams of KCl will also be formed?

11) Write each of the following numbers using scientific notation:
   a) 3,710,000 b) 0.0000042 c) 3

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12) Write each of the following numbers in standard (decimal) form:
a) 6.3×10^{5} b) 4.0760×10^{-2}

13) Round the number 81.03974 in each of the following ways:
a) to one significant figure
b) to two significant figures
c) to three significant figures
d) to four significant figures
e) to five significant figures

14) Round the number 106.48037 in each of the following ways:
a) to one decimal place
b) to two decimal places
c) to three decimal places
d) to four decimal places

15) Round the number 0.0899648 in each of the following ways:
a) to one significant figure
b) to two significant figures
c) to three significant figures
d) to four significant figures

16) Round the number 0.02963 in each of the following ways:
a) to one decimal place
b) to two decimal places
c) to three decimal places
d) to four decimal places

17) Carry out the following calculations and round your answers to the correct number of significant figures.
a) 11.41 + 0.37 = ?
b) 6.22 – 6.15 = ?
c) 9.14 + 6.77 + 5.09 = ?
d) 3.166 × 5.07 = ?
e) 59.33 × 0.04 = ?
f) 18.3057 ÷ 7.959 = ?

18) Carry out the following calculations and report your answers in scientific notation, rounded to the correct number of significant figures.
a) $\left(4.86 \times 10^{8}\right) - \left(3.1 \times 10^{7}\right) = ?$
b) $\dfrac{\left(5.926 \times 10^{-16}\right)}{\left(8.02 \times 10^{-9}\right)} = ?$
c) $\left(4.7 \times 10^{-3}\right)^{3} = ?$
d) $\sqrt[3]{\left(2.0809 \times 10^{4}\right)^{5}} = ?$

19) Solve each of the following equations for x. Round your answers to five decimal places.
a) $x - 33.28 = 16.41 - 0.63x$
b) $\dfrac{1317}{x} = 26.44$
c) $8(3.15 - 2.28x) + 6.147x = 3.6(4.05x - 0.82)$
d) $8.1x^{2} - 21.35x = 16.05$

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20) Solve the following equations for the stated variable (i.e. isolate that variable on one side of the equation).

a) Solve the equation $PV = nRT$ for V

b) Solve the equation $PV = nRT$ for n.

c) Solve the following equation for T_1:

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

21) Convert 34.7 cm into each of the following units:

a) mm b) m c) km

22) Convert 4.750 ounces to grams, given that 1 g = 0.03527 ounces.

23) What is the volume of a 3.85 g piece of iron, if the density of iron is 7.86 g/cm^3?

24) A car is traveling at 87.0 km/hr. How many meters will it travel in 37.0 seconds?

25) What is the difference (if any) between the measurements 3.5 g and 3.500 g?

26) A mixture contains 31.25 g of salt and 11.60 g of sugar. What is the mass percentage of salt in this mixture?

27) A metal bar contains 28.44% iron by mass. If the bar weighs 643.2 kg, what mass of iron does it contain?