1) Give the molar mass for each of these compounds:

a) potassium bromide
b) sodium sulfate
c) lead (II) nitrate
d) C_2H_5OH
e) acetic acid
f) iron (III) oxide
g) $C_{12}H_{22}O_{11}$
h) aluminum sulfate
i) ammonium hydrogen phosphate

2) Give the molar mass for each of these compounds:

a) sodium hydroxide
b) silver carbonate
c) chromium (III) oxide
d) ammonium carbonate
e) magnesium bicarbonate
f) $C_6H_5CO_2H$
g) $C_6H_{12}O_6$
h) $K_4Fe(CN)_6$
i) bismuth (V) arsenate

3) How many moles of atoms are in each of the following:

a) 22.5 g Zn
b) 0.688 g Mg
c) $4.5x10^{22}$ atoms Cu
d) 382 g Co
e) 0.055 g Sn
f) $8.5x10^{24}$ molecules of N_2

4) How many moles are in each of the following:

a) 25.0 g sodium hydroxide
b) 44.0 g Br_2
c) 0.684 g magnesium chloride
d) 14.8 g CH_3OH
e) 2.88 g sodium sulfate
f) 4.20 lb of zinc iodide

5) How many grams are in each of the following:

a) 0.550 mol Au
b) 15.8 mol H_2O
c) 12.5 mol Cl_2
d) 3.15 mol ammonium nitrate

6) How many grams are in each of the following:

a) $4.25x10^{-4}$ mol sulfuric acid
b) $4.50x10^{22}$ molecules carbon tetrachloride
c) 0.00255 mol Ti
d) $1.5x10^{16}$ atoms S

7) How many **molecules** are contained in each of the following?

a) 1.26 mol O_2
b) 0.56 mol C_6H_6
c) 16.0 g CH_4
d) 1000. g hydrochloric acid

8) How many **molecules** are contained in each of the following?

a) 1.75 mol Cl_2
b) 0.27 mol C_2H_6O
c) 12.0 g carbon dioxide
d) 1000. g CH_4

9) How many **atoms** are contained in each of the following?

a) 11 molecules C_2H_5OH
b) 25.0 g Ag
c) 0.0986 g Xe
d) 72.5 g $CHCl_3$

10) How many **atoms** are contained in each of the following?

a) 18 molecules dinitrogen pentoxide
b) 10.0 mol Au
c) 75.2 g BF_3
d) 15.2 g U

11) Perform the following conversions:

a) 8.66 mol Cu → g Cu
b) 125 mol Au → kg Au
c) 10. atoms C → mol C
d) 5000 molecules CO_2 → mol CO_2

12) Perform the following conversions:

a) 284 g S → mole S
b) 2.50 kg sodium chloride → mole sodium chloride
c) 42.4 g Mg → atoms Mg
d) 485 mL Br_2 (d = 3.12 g/mL) → mol Br_2

13) Exactly 1 mole of carbon disulfide contains:

a) how many carbon disulfide molecules?
b) how many carbon atoms?
c) how many sulfur atoms?
d) how many total atoms of all kinds?

14) Exactly 1 mole of ammonium nitrate contains:

a) how many ammonium nitrate molecules?
b) how many nitrogen atoms?
c) how many hydrogen atoms?
d) how many oxygen atoms?
e) how many total atoms of all kinds?

15) How many **atoms** are contained in each of the following?

a) 16.0 g of O_2
b) 0.622 mol magnesium oxide
c) 6.00×10^{22} molecules of $C_6H_{12}O_6$

16) How many **atoms** are contained in each of the following?

a) 5.0 mol of manganese (II) peroxide
b) 255 g magnesium carbonate
c) 5.0×10^{18} molecules of H_2O

17) How many grams of:

a) silver are in 25.0 g silver bromide
b) nitrogen are in 6.34 mol of ammonium phosphate
c) oxygen are in 8.45×10^{22} molecules of SO_3

18) How many grams of:

a) chlorine are in 5.0 g of lead (II) chloride
b) hydrogen are in 4.50 mol of sulfuric acid
c) hydrogen are in 5.45×10^{22} molecules of ammonia – NH_3

19) Perform the following conversions:

a) how many grams of carbon are in 67.33 mL of C_2H_5OH (d = 0.789 g/cm^3)?
b) how many liters of carbon tetrachloride (d = 1.5842 g/mL) contains 3.35×10^{25} atoms of chlorine?
c) how many atoms of oxygen are in 9.662×10^{20} molecules of mercury (II) perbromate?
d) how many grams of nitrogen are in 0.04417g of ammonium sulfate?
e) how many moles of mercury are in 6.77 g of mercury (I) phosphate?
f) how many grams of oxygen are in 34 grams of antimony (V) acetate?

20) Perform the following conversions:

a) how many grams of manganese are in a pile of strontium permanganate which contains 2.45 g of oxygen?
b) what is the mass (in grams) of chlorine in a pile of diphosphorous pentachloride containing 62.13 g of phosphorous?
c) how many atoms of chromium are in a sample of chromium (III) carbonate containing 0.098 g of carbon?
d) A sample of nickel (II) arsenate has 371.02 grams of nickel in it. How many grams of arsenic are present?