1) **a)** $1\ mol\ \mathbf{K} \times \frac{39.10\ g}{1\ mol\ \mathbf{K}} + 1\ mol\ \mathbf{Br} \times \frac{79.90\ g}{1\ mol\ \mathbf{Br}} = \frac{119.00\ \mathrm{g\ KBr}}{1\ \mathrm{mol\ KBr}}$

b) $2\ mol\ \mathbf{Na} \times \frac{22.99\ g}{1\ mol\ \mathbf{Na}} + 1\ mol\ \mathbf{S} \times \frac{32.07\ g}{1\ mol\ \mathbf{S}} + 4\ mol\ \mathbf{O} \times \frac{16.00\ g}{1\ mol\ \mathbf{O}} = \frac{142.05\ \mathrm{g\ Na_2SO_4}}{1\ \mathrm{mol\ Na_2SO_4}}$

c) $1\ mol\ \mathbf{Pb} \times \frac{207.2\ g}{1\ mol\ \mathbf{Pb}} + 2\ mol\ \mathbf{N} \times \frac{14.01\ g}{1\ mol\ \mathbf{N}} + 6\ mol\ \mathbf{O} \times \frac{16.00\ g}{1\ mol\ \mathbf{O}} = \frac{331.2\ \mathrm{g\ Pb(NO_3)_2}}{1\ \mathrm{mol\ Pb(NO_3)_2}}$

d) $\frac{46.08\ \mathrm{g\ C_2H_5OH}}{1\ \mathrm{mol\ C_2H_5OH}}$ **e)** $\frac{60.06\ \mathrm{g\ HC_2H_3O_2}}{1\ \mathrm{mol\ HC_2H_3O_2}}$

f) $\frac{159.70\ \mathrm{g\ Fe_2O_3}}{1\ \mathrm{mol\ Fe_2O_3}}$ **g)** $\frac{342.34\ \mathrm{g\ C_{12}H_{22}O_{11}}}{1\ \mathrm{mol\ C_{12}H_{22}O_{11}}}$

h) $\frac{342.17\ \mathrm{g\ Al_2(SO_4)_3}}{1\ \mathrm{mol\ Al_2(SO_4)_3}}$ **i)** $\frac{132.08\ \mathrm{g\ (NH_4)_2HPO_4}}{1\ \mathrm{mol\ (NH_4)_2HPO_4}}$

2) **a)** $22.5\ g\ \mathbf{Zn} \times \frac{1\ mol\ \mathbf{Zn}}{65.39\ g\ \mathbf{Zn}} = 0.344\ mol\ \mathbf{Zn}$

b) $0.688\ g\ \mathbf{Mg} \times \frac{1\ mol\ \mathbf{Mg}}{24.31\ g\ \mathbf{Mg}} = 0.0283\ mol\ \mathbf{Mg}$

c) $4.5 \times 10^{22}\ atom\ \mathbf{Cu} \times \frac{1\ mol\ \mathbf{Cu}}{6.022 \times 10^{23}\ atom\ \mathbf{Cu}} = 0.075\ mol\ \mathbf{Cu}$

d) $382\ g\ \mathbf{Co} \times \frac{1\ mol\ \mathbf{Co}}{58.93\ g\ \mathbf{Co}} = 6.48\ mol\ \mathbf{Co}$

e) $0.055\ g\ \mathbf{Sn} \times \frac{1\ mol\ \mathbf{Sn}}{118.71\ g\ \mathbf{Sn}} = 4.6 \times 10^{-4}\ mol\ \mathbf{Sn}$

f) $8.5 \times 10^{24}\ molecule\ \mathbf{N_2} \times \frac{1\ mol\ \mathbf{N_2}}{6.022 \times 10^{23}\ molecule\ \mathbf{N_2}} \times \frac{2\ mol\ \mathbf{N}}{1\ mol\ \mathbf{N_2}} = 28\ mol\ \mathbf{N}$

The problem asks about ATOMS. N_2 is a molecule so you have to convert to N atoms.

3) **a)** $0.550\ mol\ \mathbf{Au} \times \frac{196.97\ g\ \mathbf{Au}}{1\ mol\ \mathbf{Au}} = 108\ g\ \mathbf{Au}$

b) $15.8\ mol\ \mathbf{H_2O} \times \frac{18.02\ g\ \mathbf{H_2O}}{1\ mol\ \mathbf{H_2O}} = 285\ g\ \mathbf{H_2O}$

c) $12.5\ mol\ \mathbf{Cl_2} \times \frac{70.90\ g\ \mathbf{Cl_2}}{1\ mol\ \mathbf{Cl_2}} = 886\ g\ \mathbf{Cl_2}$

d) $3.15\ mol\ \mathbf{NH_4NO_3} \times \frac{80.06\ g\ \mathbf{NH_4NO_3}}{1\ mol\ \mathbf{NH_4NO_3}} = 252\ g\ \mathbf{NH_4NO_3}$

4) **a)** $1.26\ mol\ O_2 \times \frac{6.022\times10^{23}\ molecule\ O_2}{1\ mol\ O_2} = 7.59\times10^{23}\ molecule\ O_2$

b) $0.56\ mol\ C_6H_6 \times \frac{6.022\times10^{23}\ molecule\ C_6H_6}{1\ mol\ C_6H_6} = 3.4\times10^{23}\ molecule\ C_6H_6$

c) $16.0\ g\ CH_4 \times \frac{1\ mol\ CH_4}{16.05\ g\ CH_4} \times \frac{6.022\times10^{23}\ molecules\ CH_4}{1\ mol\ CH_4} = 6.00\times10^{23}\ molecules\ CH_4$

d) $1000.\ g\ HCl \times \frac{1\ mol\ HCl}{36.46\ g\ HCl} \times \frac{6.022\times10^{23}\ molecules\ HCl}{1\ mol\ HCl} = 1.652\times10^{25}\ molecules\ HCl$

5) **a)** **1 molecule N_2O_5 = 2 atoms N + 5 atoms O = 7 total atoms**

$18\ molecule\ N_2O_5 \times \frac{7\ atoms\ total}{1\ molecule\ N_2O_5} = 126\ atoms\ total$

b) $10.0\ mol\ Au \times \frac{6.022\times10^{23}\ atom\ Au}{1\ mol\ Au} = 6.02\times10^{24}\ atom\ Au$

c) **1 molecule BF_3 = 1 atoms B + 3 atoms F = 4 total atoms**

$75.2\ g\ BF_3 \times \frac{1\ mol\ BF_3}{67.81\ g\ BF_3} \times \frac{6.022\times10^{23}\ molecule\ BF_3}{1\ mol\ BF_3} \times \frac{4\ atom\ total}{1\ molecule\ BF_3} = 2.67\times10^{24}\ atom\ total$

d) $0.0986\ g\ Xe \times \frac{1\ mol\ Xe}{131.29\ g\ Xe} \times \frac{6.022\times10^{23}\ atom\ Xe}{1\ mol\ Xe} = 4.52\times10^{20}\ atom\ Xe$

6) **a)** $8.66\ mol\ Cu \times \frac{63.55\ g\ Cu}{1\ mol\ Cu} = 550.\ g\ Cu$

b) $125\ mol\ Au \times \frac{196.97\ g\ Au}{1\ mol\ Au} \times \frac{1\ kg\ Au}{1\times10^{3}\ g\ Au} = 24.6\ kg\ Au$

c) $10.\ atom\ C \times \frac{1\ mol\ C}{6.022\times10^{23}\ atom\ C} = 1.661\times10^{-23}\ mol\ C$

You can't have a fraction of an atom, so the decimal point implies that you have EXACTLY 10

d) $5000\ molecule\ CO_2 \times \frac{1\ mol\ CO_2}{6.022\times10^{23}\ molecule\ CO_2} = 8\times10^{-21}\ mol\ CO_2$

7) **a)** $1\ mol\ CS_2 \times \frac{6.022\times10^{23}\ molecule\ CS_2}{1\ mol\ CS_2} = 6.022\times10^{23}\ molecule\ CS_2$

b) $1\ mol\ CS_2 \times \frac{1\ mol\ C}{1\ mol\ CS_2} \times \frac{6.022\times10^{23}\ atom\ C}{1\ mol\ C} = 6.022\times10^{23}\ atom\ C$

c) $1\ mol\ CS_2 \times \frac{2\ mol\ S}{1\ mol\ CS_2} \times \frac{6.022\times10^{23}\ atom\ S}{1\ mol\ S} = 1.204\times10^{24}\ atom\ S$

d) **$1.204\text{x}10^{24} + 0.6022\text{x}10^{24} + 0.6022\text{x}10^{24} = 1.807\text{x}10^{24}$ total atoms**

8) **a)** $16.0\ g\ O_2 \times \frac{1\ mol\ O_2}{32.00\ g\ O_2} \times \frac{2\ mol\ O}{1\ mol\ O_2} \times \frac{6.022\times10^{23}\ atom\ O}{1\ mol\ O} = 6.02\times10^{23}\ atom\ O$

b) $0.622\ mol\ MgO \times \frac{1\ mol\ O}{1\ mol\ MgO} \times \frac{6.022\times10^{23}\ atom\ O}{1\ mol\ O} = 3.75\times10^{23}\ atom\ O$

c) $6.00\times10^{22}\ molecule\ C_6H_{12}O_6 \times \frac{6\ atom\ O}{1\ molecule\ C_6H_{12}O_6} = 3.60\times10^{23}\ atom\ O$

9) **a)** $5.0\ g\ PbCl_2 \times \frac{1\ mol\ PbCl_2}{278.1\ g\ PbCl_2} \times \frac{2\ mol\ Cl}{1\ mol\ PbCl_2} \times \frac{35.45\ g\ Cl}{1\ mol\ Cl} = 1.3\ g\ Cl$

b) $4.50\ mol\ H_2SO_4 \times \frac{2\ mol\ H}{1\ mol\ H_2SO_4} \times \frac{1.01\ g\ H}{1\ mol\ H} = 9.09\ g\ H$

c) $5.45\times10^{22}\ molecule\ NH_3 \times \frac{1\ mol\ NH_3}{6.022\times10^{23}\ molecule\ NH_3} \times \frac{3\ mol\ H}{1\ mol\ NH_3} \times \frac{1.01\ g\ H}{1\ mol\ H} = 0.274\ g\ H$

10) **a)** **$Sr(MnO_4)_2$** $2.45\ g\ O \times \frac{1\ mol\ O}{16.00\ g\ O} \times \frac{1\ mol\ Mn}{4\ mol\ O} \times \frac{54.94\ g\ Mn}{1\ mol\ Mn} = 2.10\ g\ Mn$

b) **P_2Cl_5** $62.13\ g\ P \times \frac{1\ mol\ P}{30.97\ g\ P} \times \frac{5\ mol\ Cl}{2\ mol\ P} \times \frac{35.45\ g\ Cl}{1\ mol\ Cl} = 177.8\ g\ Cl$

c) **$Cr_2(CO_3)_3$** $0.098\ g\ C \times \frac{1\ mol\ C}{12.01\ g\ C} \times \frac{2\ mol\ Cr}{3\ mol\ C} \times \frac{6.022\times10^{23}\ atom\ Cr}{1\ mol\ Cr} = 3.3\times10^{21}\ atom\ Cr$

d) **$Ni_3(AsO_4)_2$** $371.02\ g\ Ni \times \frac{1\ mol\ Ni}{58.69\ g\ Ni} \times \frac{2\ mol\ As}{3\ mol\ Ni} \times \frac{74.92\ g\ As}{1\ mol\ As} = 315.7\ g\ As$