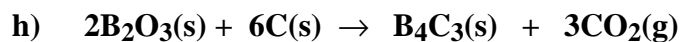
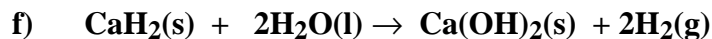
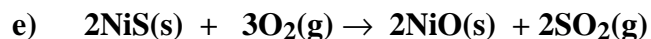
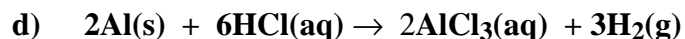
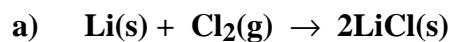
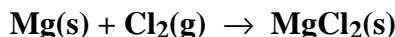


1. Balance each of the following equations

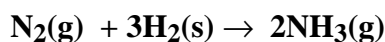


2. Write and balance the equation for each of the following

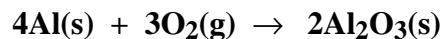
a) A formation equation for $\text{MgCl}_2\text{(s)}$.



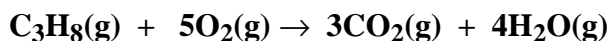
b) A formation equation for $\text{NH}_3\text{(g)}$.



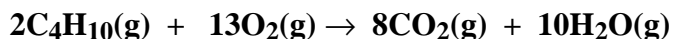
c) A formation equation for $\text{Al}_2\text{O}_3\text{(s)}$.



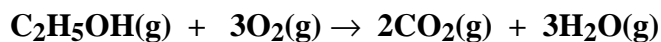
d) The reaction for the combustion of propane ($\text{C}_3\text{H}_8\text{(g)}$).



e) The reaction for the combustion of butane ($\text{C}_4\text{H}_{10}\text{(g)}$).



f) The reaction for the combustion of ethanol ($\text{C}_2\text{H}_5\text{OH(l)}$).



g) The reaction for the combustion of methyl mercaptan ($\text{CH}_3\text{SH(g)}$). (Note: when sulfur is combusted it forms sulfur dioxide, SO_2).



3. What is the mass of a hydrogen atom in kilograms and atomic mass units? Of an oxygen atom? Of a carbon atom?

Atom	Mass in kilograms	Mass in atomic mass units
H	$1.6732 \times 10^{-27} \text{ kg}$	1.00794 u
O	$2.6555 \times 10^{-26} \text{ kg}$	15.9994 u
C	$1.99268 \times 10^{-26} \text{ kg}$	12.011 u

Note: The masses that are reported above are the weighted average mass (kg) and relative, weighted average mass (u). If anyone asks about that explain. The mass of 1.00794 is the relative, weighted average mass of all three isotopes of hydrogen and is not the actual atomic mass of a hydrogen atom. But it is close enough. This is a detail I expect most students will not ask about. You do not need to discuss it either.

4. Calculate the number of atoms in each of the following;

a) $3.3464 \times 10^{-27} \text{ kg}$ hydrogen

$$3.3464 \times 10^{-27} \text{ kg} \left(\frac{1 \text{ atom H}}{1.6732 \times 10^{-27} \text{ kg}} \right)$$

= 2 atoms H (1 molecule)

b) $2.6555 \times 10^{-25} \text{ kg}$ oxygen

$$2.6555 \times 10^{-25} \text{ kg} \left(\frac{1 \text{ atom O}}{2.6555 \times 10^{-26} \text{ kg}} \right)$$

= 10 atoms O (5 molecule)

c) $1.49451 \times 10^{-24} \text{ kg}$ carbon

$$1.49451 \times 10^{-24} \text{ kg} \left(\frac{1 \text{ atom C}}{1.99268 \times 10^{-26} \text{ kg}} \right)$$

= 75 atoms C

d) 5.0397 u hydrogen

$$5.0397 \text{ u} \left(\frac{1 \text{ atom H}}{1.0794 \text{ u}} \right)$$

= 5 atoms H

e) 32 u oxygen

$$32 \text{ u} \left(\frac{1 \text{ atom O}}{15.9994 \text{ u}} \right)$$

= 2 atoms O

f) 72 u carbon

$$72 \text{ u} \left(\frac{1 \text{ atom O}}{12.0111 \text{ u}} \right)$$

= 6 atoms C

g) 1.00794 g hydrogen

$$1.00794 \text{ g} \left(\frac{1 \text{ atom H}}{1.6732 \times 10^{-24} \text{ kg}} \right)$$

= 6.02×10^{23} atoms H

h) 16 g oxygen

$$32 \text{ g} \left(\frac{1 \text{ atom O}}{2.6555 \times 10^{-23} \text{ kg}} \right)$$

= 6.02×10^{23} atoms O

h) 12 g carbon

$$12 \text{ g} \left(\frac{1 \text{ atom C}}{1.99268 \times 10^{-23} \text{ kg}} \right)$$

= 6.02×10^{23} atoms C

