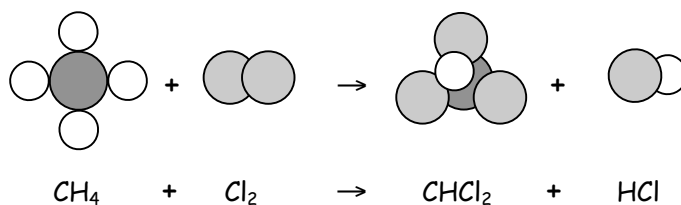


Keeping Track of Atoms

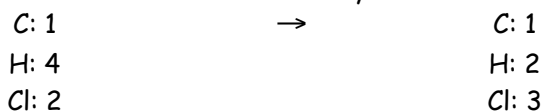
Keeping track of atoms is an application of the Law of Conservation of Mass. You have done this before, but it is an important skill to work on and refine.

Example:

When methane gas (CH_4) and chlorine gas (Cl_2) react at water treatment plants, liquid chloroform (CHCl_2) and hydrogen chloride (HCl) gas form.

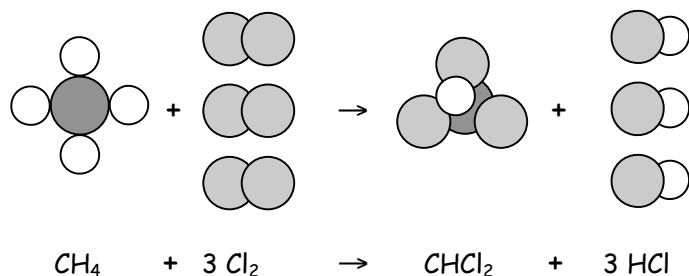


Atom Inventory:



Is the equation balanced?

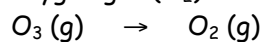
If not, add coefficients to the equation until both sides of the atom inventory are equal. This may require several attempts.



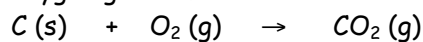
Answer each question below by using the method shown in the example.

- Drawing a representation of the chemical equation based on chemical equation given
- Complete an "atom inventory" of each side of the equation
- Decide if the equation is balanced and if not, insert coefficients to balance the equation (some coefficients have already been included to help you)
- Fix your drawing so that it too is balanced

1. Ozone gas (O_3) can decompose to form oxygen gas (O_2):



2. In a blast furnace solid carbon reacts with oxygen gas to form carbon dioxide:



3. The burning of propane (C_3H_8) with oxygen is a common heat source for campers. A chemical statement showing this reaction is:

$$C_3H_8(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$$
4. Ammonia (NH_3) in the soil reacts continuously with oxygen gas (O_2):

$$NH_3(g) + O_2 \rightarrow NO_2(g) + H_2O(l)$$
5. Many people use natural gas as a source of household heat. Natural gas contains methane (CH_4) which burns with oxygen gas in air according to the equation:

$$CH_4 + O_2 \rightarrow CO_2 + 2 H_2O$$
6. When an acid such as HBr reacts with a metal, hydrogen gas and an ionic compound are often formed, such as the equation below:

$$HBr + Mg \rightarrow H_2 + MgBr_2$$
7. Hydrogen sulfide (H_2S) and silver react in air to form silver sulfide (Ag_2S) which is the tarnish you often see on silver products:

$$4 Ag + 4 H_2S + O_2 \rightarrow 2 Ag_2S + 4 H_2O$$
8. Paper is mostly made of cellulose ($C_6H_{10}O_5$) burns in air to form carbon dioxide and water vapor:

$$C_6H_{10}O_5 + 6 O_2 \rightarrow 6 CO_2 + 5 H_2O$$
9. At high temperatures, iron (Fe) can be separated from iron ore (Fe_2O_3):

$$Fe_2O_3(s) + CO(g) \rightarrow Fe(l) + 3 CO_2$$
10. The final step in refining copper ore (CuO) is:

$$CuO(s) + C(s) \rightarrow Cu(s) + CO_2(g)$$