4.3 Balancing Chemical Equations

- Chemical reactions result in_____.
  - _____ occur when new substances are created.
  - The original substance(s), called_____,

    change into new substance(s) called_____.
- Chemical reactions can be written in different ways.
  - A word equation:
  - _____
  - A symbolic equation:

    _____
- Chemical change means _____are created.
  - No _____is created or destroyed; atoms are just rearranged.
  - All of _____in the reactants = all of

    _____in the products.
  - John Dalton, 200 years ago, realized that_____

    _____.
  - Number of each _____= number of each atom in products.
- The law of_____:

- In chemical reactions, atoms are neither _____nor_____.
- This law was developed by Antoine and Marie-Anne _____in the 1700s.
- _____= _____

- The simplest form of chemical equation is a word equation.
  - Potassium metal + oxygen gas → potassium oxide

- A _____equation shows the formulas of the elements/compounds.
  - A _____equation shows atoms, but not quantities of atoms.

- A _____chemical equation shows all atoms and their quantities
  - Balancing ensures that _____is the same on both sides of the reaction arrow.
  - Always use the smallest whole-number ratio.

- Using the law of conservation of mass, we can count atoms to balance the number of atoms in chemical equations.

Word equation: methane + oxygen → water + carbon dioxide

Skeleton equation: CH_4 + _____

To balance the compounds, take note of how many atoms of each element occur on each side of the reaction arrow.

- Skeleton equation: _____

__ carbon, __ hydrogen, __ oxygen → __ carbon,__ hydrogen, __ oxygen

- To balance, attempt to find values that equate atoms on both sides
- Balanced equation: _____

- Word equations require careful examination to be written correctly.
  - The chemical symbol is used for most elements not in a compound.
    - Be careful of _____and

_____elements such as O_2, P_4 and S_8 .

    - The "special seven" are all diatomic elements

  - Several common covalent molecules containing hydrogen have common names that you should know.

For example, methane =_____, glucose =_____,

ethane =_____, ammonia = _____

- Balance chemical equations by following these steps:

_____will work but can be very inefficient.

Balance compounds _____and elements_____.

Balance _____compound at a time.

Only add_____; NEVER change subscripts.

If ___ and ___ appear in more than one place, attempt to balance them LAST.

_____ions (such as SO_4^{2-}) can often be balanced as a whole group.

Always double-check after you think you are finished.

Note: you will need to be able to do this on your own, however, you can always check your answers. Search the internet for "balancing chemical formula" and some websites can provide you with a "balancing calculator".

- Balance the following:
  - $Fe + Br_2 \rightarrow FeBr_3$
  - $Sn(NO_2)_4 + K_3(PO_4) \rightarrow K(NO_2) + Sn_3\ (PO_4)_4$
  - $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$