Nitrogen Monoxide, $\begin{array}{c} N \\ | \\ O \\ | \\ N \end{array}$

Nitrogen Dioxide, $\begin{array}{c} N \\ O\ |\ O \\ N \end{array}$

Nitrogen Trioxide, $\begin{array}{c} N \\ O\ O\ O \\ N \end{array}$

Nitrogen Tetroxide, $\begin{array}{ccc} O & - N - & O \\ | & | & | \\ O & N & - O \end{array}$

Nitrogen Pentoxide, $\begin{array}{ccc} O & - N - & O \\ | & O & | \\ O & - N - & O \end{array}$

and Alumina Chloride will be

$$\begin{array}{c} Cl\quad Cl \\ |\qquad | \\ Cl-Al-Al-Cl \\ |\qquad | \\ Cl\quad Cl \end{array}$$

The same remark applies to this as to rational formulæ. It does *not actually show* the direction of the force or power, but it helps the student by simplifying some things. It is a purely speculative hypothesis in both cases. Such a representation of the combining powers of elements may help us to explain why compounds radical enter into combinations so powerfully. Carbon is a tetrad, (that is, has *four* combining worths), Oxygen is a dyad (i. e., has *two* combining worths), therefore the comp. rad. Carbon Monoxide written *graphically* is $\begin{array}{c} C = \\ \| \\ O \end{array}$ which shows us two worths are left free (non-saturated), and ready to enter into composition with some other body, hence it forms part of another compound body very readily. *Olefiant gas* is, $\begin{array}{c} H\quad H \\ |\qquad | \\ -C-C- \\ |\qquad | \\ H\quad H \end{array}$ leaving two worths non-saturated, hence ready to take part in a new combination.

Atomic formulæ are used when we express the composition of a body by giving the elements of which it is composed and the number of atoms of these elements present. Thus, ammonia is NH_3. This is an example of an *atomic combination*, which forms one molecule.

Molecular formulæ are used in expressing chemical actions; thus, when we express the formation of ammonia we use molecular formulæ, $2(NH_3,HCl)+CaO=CaCl_2+H_2O+2NH_3$, and this furnishes an example of *molecular combination*. It is this formulæ we use in chemical equations.

Atomicity, generally called *valency* or *quantivalence*—as these terms are now used they are synonymous. This is perhaps the most unsatisfactory part of Chemistry, as no satisfactory explanations have yet been given for the many irregularities that are noticed in connection with this law. *Atomicity* means the relative power or worth, compared with Hydrogen, which Radicals have of uniting to form compounds or of replacing each other in a compound. We may illustrate this graphically as follows:—1 mol. of Hydrogen is H—H, of Hydrochloric acid H—Cl, where an atom of Chlorine takes the place of an atom of Hydrogen in the mol. of Hydrogen —hence we say Cl is *monovalent*, or it is a *monad*: 2 mols. of Hydrogen is $\begin{array}{c} H-H \\ |\quad | \\ H-H \end{array}$ one mol. of water is $\begin{array}{c} H \searrow \\ H \nearrow \end{array} O$, where the atom of O has replaced two of H, hence O is *divalent*, or it is a *dyad*: 3 mols. of H is $\begin{array}{c} H-H \\ |\quad | \\ H-H \\ |\quad | \\ H-H \end{array}$ and one mol. of ammonia is $\begin{array}{c} H \searrow \\ H-N \\ H \nearrow \end{array}$, where one atom of N has replaced 3H, hence N is *trivalent*, or a *triad*; 4 mols. of H is $\begin{array}{c} H-H \\ |\quad | \\ H-H \\ |\quad | \\ H-H \\ |\quad | \\ H-H \end{array}$ and one of marsh gas is $\begin{array}{c} H \searrow \\ H \searrow \\ H \nearrow \\ H \nearrow \end{array} C$, where one atom of C has replaced 4H, hence Carbon is *tetravalent*, or a *tetrad*. This atomicity refers to powers of the *atoms* only of simple radicals, and to the *molecule* of compound radicals. In the mol. of Hydrogen there are two atoms,