WEBER SCIENTIFIC

Understanding Chemical Concentrations

We sell a number of chemical solutions (Potassium hydroxide, sodium hydroxide, sodium thiosulfate, etc). There are three common ways of expressing chemical concentrations:

1. **Molarity (M) =** number of moles per liter.
2. **Molality (m) =** number of moles per kg of solvent
3. **Normality (N) =** number of gram equivalents per liter.

A mole of a chemical is equal to its atomic weight. A gram equivalent of a chemical is its atomic weight divided by the valence. You have to be a pretty good chemist to figure out the gram equivalent of a chemical. I usually refer to a chemical reference.

As an easy example we can use Sodium Hydroxide (NaOH).

The atomic weight of Na =	22.989
The atomic weight of O =	15.999
The atomic weight of H =	1.007
TOTAL =	39.995

To make a **1M** solution of NaOH you add 39.995 gm to 1 liter of water.

To make a **1m** solution of NaOH you add 39.995 to 1000 ml (1 L) of water. Water is the universal solvent and it has the density (specific gravity) of 1. That is, 1 mL of water weighs 1 gram. A liter of water weights 1 kg.

To make a 1N solution of NaOH you add 39.995 gm to 1 liter of water.

So, in this example **1M, 1m and 1N** solutions of NaOH are very similar. Other chemicals can be quite different.

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