Glossary

- Dimension: A physical entity, which can be observed and/or measured, is defined qualitatively by a dimension. For example, time, length, area, volume, mass, force, temperature, and energy are all considered dimensions.

- Unit: The quantitative magnitude of a dimension is expressed by a unit;

- Unit of length may be measured as a meter, centimeter, or millimeter. Unit of length (meter): The meter (m) is the length equal to 1,650,763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels 2p10 and 5d5 of the krypton-86 atom.

- Unit of mass (kilogram): The kilogram (kg) is equal to the mass of the international prototype of the kilogram. (The international prototype of the kilogram is a particular cylinder of platinum iridium alloy, which is preserved in a vault at Sèvres, France, by the International Bureau of Weights and Measures.)

- Unit of time (second): The second (s) is the duration of 9,192,631,770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium-133 atom.

- Unit of amount of substance (mole): The mole (mol) is the amount of substance of a system that contains as many elementary entities as there are atoms in 0.012 kg of carbon 12.

- Newton (N): The newton is the force that gives to a mass of 1 kg an acceleration of 1 m/s^2.

- Joule (J): The joule is the work done when due to force of 1 N the point of application is displaced by a distance of 1 m in the direction of the force.

- Watt (W): The watt is the power that gives rise to the production of energy at the rate of 1 J/s.

- A system is any region prescribed in space or a finite quantity of matter enclosed by a boundary, real or imaginary. The boundary of a system can be real, such as the walls of a tank, or it can be an imaginary surface that encloses the system.

- The value of an extensive property depends on the extent or the size of a system. For example, mass, length, volume, and energy depend on the size of a given system.

- Intensive properties do not depend on the size of a system. Examples include temperature, pressure, and density. For a homogeneous system, we can often obtain an intensive property by dividing two extensive properties.

- Density is defined as mass per unit volume, with dimensions (mass)/(length)^3. The SI unit for density is kg/m^3. Density is an indication of how matter is composed in a body.

- Concentration is a measure of the amount of substance contained in a unit volume. It may be expressed as weight per unit weight, or weight per unit volume. Normally, concentration is given in percentage when weight per unit weight measurement is used.

- Another term used to express concentration is molarity, or molar concentration. Molarity is the concentration of solution in grams per liter divided by the molecular weight of the solute.

- Mole fraction is the ratio of the number of moles of a substance divided by the total number of moles in the system. Thus, for a solution containing two components, A and B, with number of moles n_A and n_B, respectively, the mole fraction of A, X_A, is

$$X_A = \frac{n_A}{n_A + n_B}$$

- ^{o}Brix = (kg solute/kg solution)*100

- $\text{Porosity} = 1 - \frac{\text{Bulk density}}{\text{Solid density}}$
- $\text{Interparticle Porosity} = 1 - \frac{\text{Bulk density}}{\text{Particle density}}$

- Moisture content expresses the amount of water present in a moist sample. Two bases are widely used to express moisture content; namely, moisture content wet basis and moisture content dry basis. Moisture content wet basis (MC_{wb}) is the amount of water per unit mass of moist (or wet) sample.

$$MC_{wb} = \frac{\text{mass of water}}{\text{mass of moist sample}}$$

Moisture content dry basis (MC_{db}) is the amount of water per unit mass of dry solids (bone dry) present in the sample. Thus,

$$MC_{db} = \frac{\text{mass of water}}{\text{mass of dry solids}}$$

A relationship between MC_{wb} and MC_{db} may be developed as follows:

$$MC_{wb} = \frac{\text{mass of water}}{\text{mass of water + mass of dry solids}}$$

Divide both numerator and denominator of above equation with mass of dry solids:

$$MC_{wb} = \frac{\text{mass of water}/\text{mass of dry solids}}{\dfrac{\text{mass of water}}{\text{mass of dry solids}} + 1}$$

$$MC_{wb} = \frac{MC_{db}}{MC_{db} + 1}$$

This relationship is useful to calculate MC_{wb} when MC_{db} is known. Similarly, if MC_{wb} is known, then MC_{db} may be calculated from the following equation:

$$MC_{db} = \frac{MC_{wb}}{1 - MC_{wb}}$$

The moisture content values in the preceding equations are expressed in fractions. Note that moisture content dry basis may have values greater than 100%, since the amount of water present in a sample may be greater than the amount of dry solids present.