BASIC PARAMETERS

Molecular Number Density: Definition of number density. Number density in ideal gases. Number density in the ***p***-population. Number density in the interactive population. Still air parameters. References.

Molecular Masses: Definition of mean molecular mass. Variability of molecular masses. Variability as a function of scale. Variability as a function of meteorological processes. Variability as a function of ecological processes. Mean molecular masses. Isotopic variations in molecular masses. Carbon-14. Abundance of water vapor in the free atmosphere. Mean molecular impulse masses. Mean impulse masses of water vapor. Significance of the mean impulse masses. Molecular masses in moving air. Table: Mean molecular masses of dry air components. Table: Isotopic masses and abundances of dry air. Table: Isotopic masses and abundances of water vapor (VSMOW). References.

Mass Densities**:** Mean atmospheric density. Still air parameters. References.

Molecular Velocities: Definition of summed kinetic velocities. Mean proximity velocities. The standard deviation of the proximity velocity distribution. Probability density curve for the proximity velocity in ideal gases. Distribution function for proximity velocities over the ***p***-axis. Distribution function for single-arm proximity velocities. Mean single-arm proximity velocities. Population density function for impulse velocities in molecular flux. Mean impulse velocity. Comparison of molecular velocity parameters. Still air parameters. References.

Sigma: Definition of sigma as the root-mean-square molecular proximity velocity. Definition of sigma as the standard deviation of a statistical distribution. Definition of sigma as a variable in the thermal term. Definition of sigma in terms of the speed of sound. Role of sigma in the population density curve. References.

Molecular Flows: Equivalence of flow numbers. Free paths of interactive molecules. The imaginary tunnel. The Universal Molecular Flux. Still air parameters. References.

Molecular Momenta: Definition of molecular momentum. Molecular momenta in the ***p***-population. Molecular momentum in the ***i***-population. Distribution of molecular proximity momenta. Distribution of molecular impulse momenta. Mean molecular momenta. Conservation of molecular

momenta. Loss of momentum magnitude. Loss of momentum direction. Still air parameters. References.

Molecular Interactions: Definition of molecular interaction. Molecular interactions with forces. Molecular interactions with objects. Molecular interactions with a moving object. Molecular impulse magnitudes. Unbalanced interactions. Still air parameters. References.

Intermolecular Collisions: Definition of an intermolecular collision. Intermolecular collision frequency. Effective molecular radius. Approximations for humid air. Molecular shape. Intermolecular collisions with a stationary molecule. Intermolecular collisions with a moving molecule. Intermolecular collisions in moving air. Frequency of collisions in the free atmosphere. Still air parameters. References.

Molecular Free Paths: Molecular free path. Mean molecular free path. Mean free paths in the free atmosphere. Still air parameters. References.

Molecular Impulses: Definition of impulse. Impulse and momentum. Impulses in ideal gases. Constraints in real gases. Significance of molecular impulses. Molecular impulses in moving air. Still air parameters. References.

Kinetic Energies of Translation: Definition of kinetic energy of translation. Kinetic energy of translation in the ***p***-population. Kinetic energy of translation in the ***i***-population. Comparison of the two population parameters. Derivatives for the ***p***-population. Distribution function for the ***p***-population. Distribution function for the ***i***-population. Comparison of kinetic energies of translation. Equivalences. Still air parameters. References.

Translational Equipartition: This essay considers certain uncertainties in how kinetic energy is transferred between the internal kinetic energies of gas molecules (energies of rotation, vibration, and libration) and their external kinetic energies (the various kinetic energies of translation), and vice versa.

Still Air Parameters: Gives numerical values for all the basic parameters in still air with no net evaporation or condensation. The system temperature is postulated at 25° C (298.15K), and the system pressure is 1,000 hectopascals. The system vapor pressure is 10 hectopascals. Values for the unified atomic mass unit, Avogadro's number, and Boltzmann's constant are taken from the 2010 CODATA. The governing equation is $\bar{p} = \bar{n}\mathrm{k_B}\bar{T} = \bar{n}\bar{m}_i\sigma^2$.