FOUNDATION MENU

THE DISCRETE UNIVERSE: This is a philosophical statement outlining how I view the universe. I believe it to be a discrete entity composed of other discrete entities. Neither infinity nor continua exist in the real universe except as concepts in the mind of man. All dimensions of measurement—mass, distance, time—are composed of whole number multiples of basic quanta.

THE COMPOSITION OF THE ATMOSPHERE: The atmosphere at any given instant is a complex mechanical mixture of matter and energy. The atmosphere contains four phases of matter and several kinds of energy. The physical composition of the atmosphere is described and the abundance of the most common natural atmospheric gases is evaluated.

THE DYNAMIC ATMOSPHERE: This essay introduces the atmosphere as a complex but very discrete system of gases, liquids, solids, ions, atomic fragments, neutrinos, and photons. It emphasizes the atmosphere's most compelling characteristic—its mutability. The measurable parameters of the atmosphere are continually changing from place to place (often over very short distances) and from time to time (often from second to second). The reasons for some of these changes are well understood. The reasons for other changes we do not yet fully understand.

THE KINETIC THEORY OF GASES: This essay introduces the kinetic theory of gases—the theory that all gases are composed of discrete particles in continual movement. At commonly encountered atmospheric temperatures and pressures, the distances between these particles are many times their effective diameters, so that most of a gas is empty space—as far as matter is concerned. It is the chemical and physical nature of these microscopic particles and their movements that make up the measurable characteristics of macroscopic disciplines such as thermodynamics and fluid mechanics.

STATISTICAL MECHANICS: This essay introduces the concept of statistical mechanics. Statistical mechanics uses the mathematical tools of probability to describe the most probable mechanical behavior of such very large numbers of individual molecules that their individual behavior cannot be described with the tools we currently possess. It makes use of the concept (sometimes called, "the law of large numbers") that the probability of the actual behavior of such a large collection of molecules ever departing significantly from the most probable behavior is vanishingly small.

THE IDEAL GAS: This paper introduces the concept of an ideal gas and also introduces the concept of conditions of equilibrium. They are introduced as teaching tools, with strong warnings

that the real gases of the free atmosphere do not behave as ideal gases and that conditions of equilibrium are never found in that free atmosphere.

THE STATE OF A GAS: This one-page essay defines what a "state" is in gas theory and introduces the laboratory version of the *Ideal Gas Equation of State*. The essay goes on to show how this version leads to the thermodynamic version of that same *Ideal Gas Equation of State.*

GAS LAWS IN THE FREE ATMOSPHERE: This essay shows how many of the gas laws useful and valid in the laboratory are neither when applied to the free atmosphere. Twelve important gas laws are examined in terms of their relevance to the workings of the free atmosphere.

EQUILIBRIUM AND QUASI-EQUILIBRIUM: This essay defines what equilibrium means in this collection of essays, and does the same for non-equilibrium and quasi-equilibrium.

THE THREE PRINCIPLES: Establishes the three basic principles that guide the entire collection of papers. In a nutshell, these are: 1) Sensors only interact with a sub-population of gas molecules. 2) This sub-population has parameters that differ from the general population. 3) Sensors only measure parameters that are normal to their surface.

PROXIMITY SPACE: Introduces a supplemental spatial dimension to the three established Cartesian dimensions: proximity space. The space only comes into existence when a surface of interest is postulated, and is relative only to that single surface of interest. The various terms generated by proximity space are introduced and defined.

THE PROBABILITY DENSITY CURVE: Introduces the probability density curve and defines its utility in kinetic gas theory and statistical mechanics. The essay shows how the probability density curve gives rise to the normal curve and the two error functions.