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# F O R E W O R D

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It is necessary to define what chemistry is. It is usually defined as the study of the composition and structure of matter, and especially the study of the changes that occur in matter. Chemistry thus touches and encompasses all other sciences. The field of chemistry in fact touches the entire universe, from far-reaching galaxies to human cells. Behind our daily human needs, such as food, water, and shelter, are the chemical processes that call for such necessities. Beyond our own needs are the chemical processes that create the major environmental changes that we as humans are so accustomed to, use for our benefit, and strive to understand and control.

The ancient Greeks' universe comprised four elements: fire, air, water, and earth. These chemical elements were used in describing the complex interactions among what today we call the five global environmental cycles.

The ancient Chinese defined five courses that align with the five major environmental cycles discussed in this book: metal (lithosphere), wood (biosphere), water (hydrosphere), fire (atmosphere), and soil (pedosphere). The Chinese courses interact with each other, and when one course is not in harmony with another, the balance between the courses is negatively affected. Similarly, the major cycles can be harmonious actors on a global stage, or imbalances can occur. This may happen between two cycles, such as the pedosphere and hydrosphere, or between any other two or among any three or four cycles.

A human being is simply an observer of these five global environmental cycles — we are a chemical soup that has fallen into the cycles of nature. However, we humans also have the ability to disrupt the natural harmony that exists among the cycles. Controlling, repairing, or leaving the movement of the cycles to themselves requires a deep understanding of the cycles themselves. This book is an introduction to the major environmental cycles, and is a gateway to understanding the technology that humans use to benefit from, repair, and maintain the environment. This is the mission of environmental chemistry.