

Biological Interpretation of the Periodic Table

16.1 Introduction

The periodic table of chemical elements is a very well-known standard geometric interpretation of the relative positions of recognized atoms. Traditionally the arrangement is based upon the atomic number and relative size which makes logical sense to physicists and chemists. However for the biologist the logical arrangement based on atomic size and internal arrangements does not sense from aspects commonly observed in the biochemical or living environments. This more biologically oriented version of the periodic table rose as a result of a request from environmental engineers working in Japan. It was decided to reconstruct the periodic table in a minimalistic manner to reflect the biologically important features of the atoms rather than their basic geometry.

From the biological perspective there are three major categories: (1) biologically essential; (2) neutral in that these atoms are not presently considered bio-effective in any manner; and (3) atoms that are poisonous or toxic in any manner to living systems. These three categories are dynamically dependent on the concentration of atom that then affects its impact (if any) on biologically living systems. As the concentrations rise it is common for three phases of effect on life to be observed. These changes with concentration move from a null effect at very low concentrations; to a stimulative effect; then to a second neutral effect; and finally at high concentrations to toxic effects. This type of interaction pattern applies to biologically interactive atoms. Another major interaction that affects the functionality of biological systems is the ratios between interactive atoms. This can lead to some atoms needing to be critically present in restrictive minimal concentrations while others could be above the maximum limit for biological activity. Here some atoms could therefore be present in trace amounts thus limiting biological activity while others would be in concentrations that could be toxic to the living systems. Because of these complex interactive factors possessed by all of the biologically interactive

atoms, any attempt to simplify the geometric arrangement of the periodic table evokes hazards in the interpretation.

16.2 Biological interpretation of the Periodic Table

Limitation in the biological periodic table (Figure 16.1) it should be recognized in the interpretation that this table includes:

1. Only selected elements have been included in the periodic table on the basis of general knowledge of their function
2. Those elements that have been included are all subject to the concentration paradigm where low concentrations can be neutral or stimulative to biological systems while higher concentrations would be lethal (toxic).
3. Elements influencing biological activity in any form are going to be affected to some extent by other elements present and forming significant influences at particular ratios with other elements
4. Microorganisms as communities possess unique abilities to control the impacts of elements by binding these into bio-accumulates temporarily holding even the potentially toxic elements away from the cells in slimes (extracellular polymeric substances). When the slimes collapse releasing the bio-accumulates then such potentially toxic elements would be released at much high concentrations into the environment causing sudden unpredictable impacts.
5. This periodic table is designed to form simply an initial guide and confirmation and verification would need to be sought from reliable scientific sources before any action was taken.
6. Over time this biological interpretation of the periodic table will be subject to revision as more scientific understanding becomes available.
7. This biological periodic table is for general information purposes only and does not include all of the atoms but only those considered relevant to the surface biota on Earth.

