Fundamental Building Blocks in Chemistry in Harmony with Unification Thought

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INTRODUCTION

In view of Unification Thought, God's attributes include the dual characteristics of *Sungsang* and *Hyungsang*, the dual characteristics of Yang and Yin, and the Individual Images, where the two dual characteristics are referred to as Universal Image. Moreover, God's *Sungsang* and *Hyungsang* each possess Yang characteristics as well as Yin characteristics, and essentially *Sungsang* and *Hyungsang* are not heterogeneous.

What follows is that all things are expected to possess dual characteristics of *Sungsang* and *Hyungsang*, and these characteristics each possess Yang and Yin characteristics, since they are created to resemble God's dual characteristics exactly. To be specific, manifestations of God's *Sungsang* in various dimensions include, for example, mind in human body, instinct in animals, life in plants, and physicochemical character in minerals in this order of lower dimensions, while corresponding human body, body of animals, and materials of plants and minerals are examples of the manifestations of God's *Hyungsang* in different dimensions.

In this article, we would like to examine compatibility between the view of modern science and the view of Unification Thought on the manifestation of God on the lowest dimension. As manifestation of God on the lowest dimension, we prefer "matter" to "minerals", since matter refers to something more fundamental in the Universe.

Matter is defined as anything having mass and occupying space and it can be classified into element and compound in chemistry. An element is defined as a substance that consists of only one kind of atom, and atom, of course, is the smallest

particle of an element that has the chemical properties characteristic of that element. A compound is a substance made up of atoms of at least two different elements in a definite ratio.

In this article, we use ionic compound and molecular compound to distinguish compound consisting of ions(ionic compound) from that consisting of molecules(molecular compound). By definition molecule is a grouping of two or more atoms held together by covalent bonds.

The properties of matter can be separated into physical properties and chemical properties. The physical properties of a substance are those that can be observed without changing the substance into another substance, and include odor, color, density, physical state, melting point, and freezing point, for example. On the other hand, the chemical properties of a substance are those that can be observed when a substance is transformed into other substance(s). Rusting of an Iron and burning of methane are examples of chemical properties.

It is not difficult to find parallel between Unification Thought and chemistry concerning matter, manifestation of God on the lowest dimension: *Hyungsang* of an element corresponds to atoms and *Sungsang* of an element corresponds to its physical and chemical properties, and *Hyungsang* of a molecular compound corresponds to molecules and *Sungsang* of a molecular compound corresponds to its physical and chemical properties, and *Hyungsang* of an ionic compound corresponds to ions and *Sungsang* of an ionic compound corresponds to its physical and chemical properties. In the following discussion, we take a new look at atoms and molecules and their physical and chemical properties in terms of *Hyungsang* and *Sungsang*, and examine Yang and Yin characteristics in *Sungsang* and *Hyungsang*.

DISCUSSION

The view on atoms in Unification Thought is that they exist for the purpose of forming molecules and maintaining their own existence as atoms at the same time, and similar analogy applies to the molecules. This view on atoms and molecules is shared by chemistry, since chemistry is the study of matter and the changes it undergoes.

Macroscopically speaking, elements, molecular compounds, or ionic compounds of measurable quantities are involved in chemical reactions, and the resulting products are usually more complex than the starting materials. On microscopic level, chemical reaction occurs among atoms, molecules, or ions according to stoichiometry of the chemical equation. Since ions are formed from atoms or molecules by loss or gain of electron(s), we may say that atoms and molecules are fundamental building blocks in chemistry, and we will focus mainly on atoms and molecules. In practice, however, even simple diatomic molecules are not obtained by reaction between two atoms, and it is only very recent that formation of a molecule from atoms using a molecular tweezer begins to appear plausible.

Currently, 112 elements are known to us, and among them 88 elements occur naturally, and the rest are synthesized in the laboratories or nuclear reactors, and they spontaneously change into other elements by radioactive decay. In other words, 88 elements had been created before our time, and most of them last forever unlike those man-made elements.

So, there is definitely something fundamental about atoms, and we would like to view atoms in terms of Four-Position Base. In Four-Position Base, an atom is viewed as "new entity" as a result of give-and-receive action between nucleus(Subject) and electrons(Object) for the purpose of creation. However, we do not view molecules in terms of Four-Position-Base, since molecules are formed in chemical reactions.
In our designation of atoms as *Hyungsang* and of physical and chemical properties as *Sungsang* in an element, and of molecules as *Hyungsang* and of physical and chemical properties as *Sungsang* in a molecular compound, we need to examine the relationship between atoms and the physical and chemical properties of an element and the relationship between molecules and the physical and chemical properties of a molecular compound.

In the case of an element, the relationship between atoms and the chemical properties of an element is obviously homogeneous, since atom is by definition the smallest particle of an element having the chemical characteristics of that element. Alternatively, it is the valence-shell electron configuration of an atom that dictates chemical properties of an element, and this is well represented in a periodic table. In a periodic table, elements in a given group have the same valence-shell electron configuration, and share certain chemical characteristics with each other as well. For

example, elements in Group1A, which are called the alkali metals, are powerful reducing agents, and elements in Group7A, which are called halogens, are powerful oxidizing agents, while elements in Group8A, which are called noble gases, are unreactive. The relationship between molecules and the chemical properties of a molecular compound is also homogeneous, since a single molecule has the same chemical characteristics as a molecular compound as evidenced by the fact the same stoichiometry applies to a chemical reaction regardless of the quantities of molecules involved.

Therefore, the chemical properties of an element(or a molecular compound) is actually the properties of an atom(or a molecule). In Unification Thought, the chemical properties of the manifestation of God on the lowest dimension refer to the properties of the individual truth body.

However, atoms do not necessarily have physical properties of the element. For example, we cannot say that a gold atom is yellow or melting and water molecule is liquid or freezing, and this is because many of the physical properties of substances are bulk properties. Bulk properties are properties that depend on the collective behavior of large number of atoms, and we can think of bulk properties as properties of "connected body" in Unification Thought. Thus, the formation of an element from atoms in the presence of interatomic forces can be viewed as the formation of connected body from the individual truth bodies via give-and-receive action in Unification Thought. Similarly, the formation of a molecular compound from molecules in the presence of intermolecular forces can be viewed as the formation of connected body from the individual truth bodies via give-and-receive action.

It should be noted that atoms and molecules are held together by intermolecular forces, and intermolecular forces include London forces(or instantaneous dipole-induced dipole forces), Dipole-Dipole attractions, and Hydrogen Bonding.

Therefore, the physical properties belong to the properties of an element(or a molecular compound) instead of an atom(or a molecule). In Unification Thought, the physical properties of manifestation of God on the lowest dimension refer to the properties of connected body instead of individual truth body.

For a given element(or a molecular compound) its physical state, which is the

physical property of an element(or a molecular compound), depends on the average kinetic energy of atoms(or molecules): gas, liquid, and solid are the physical states in the order of decreasing average kinetic energy of atoms(or molecules). Also, consideration of Gibbs free energy in phase equilibria shows that an increase in pressure leads to an increase in both the melting point and boiling point for the majority of substances. From these considerations, we can see that the physical properties of an element(or a molecular compound) is related to the state of atoms(or molecules).
Based on our argument so far, atoms(or molecules) and the chemical and physical properties of an element(or a molecular compound) are correlated, and this relationship is referred to as "not essentially heterogeneous" in Unification Thought.

Yang and Yin characteristics of atoms or molecules can be easily identified in their structures. Each atom is composed of nucleus with positive charges(Yang) and electrons with negative charges(Yin) around the nucleus, and the structure of each molecule is built with the nuclei(Yang) and total electrons(Yin) are spread around the structure, which is called delocalization of electrons in chemistry.

In changes of the physical state, melting and boiling occur rapidly when input energy is high, but occur slowly when input energy is low. In chemical reactions, the rate of reaction is rapid at high temperatures, but it is slow at low temperatures. These show that the chemical and physical properties of an element(or a molecular compound) can be revealed in a fast or slow rate depending on the conditions of atoms(or molecules), and this can be viewed as proceeding "intensely(Yang)" or "not intensely(Yin)" in Unification Thought.

In this article, we have not discussed ionic compound, which is composed of cations(Yang) and anions(Yin) via ion-ion forces(give-and-receive action), specifically, however, it is not difficult to draw the same conclusions as in an element or a molecular compound using the same line of thinking as above.

CONCLUSION

In this article, we have extended the scope of manifestation of God on the lowest dimension from minerals to matter. With a separation of matter into element and

compound, we have been able to show that the relationship between atoms(or molecules) and physical and chemical properties of an element(or molecular compound) is not essentially heterogeneous.

In the process, we have brought out the distinction between the chemical properties and the physical properties of the manifestation of God on the lowest dimension that the chemical properties are properties of an individual truth body and the physical properties are the properties of the connected body.

Next, we have shown that atoms and molecules(*Hyungsang*) with their nuclei(Yang) and electrons(Yin) satisfy Yang and Yin characteristics in *Hyungsang*. Also, physical and chemical properties(*Sungsang*)which proceed intensely(Yang) or not intensely(Yin) depending on the conditions of the system have been shown to satisfy Yang and Yin characteristics in *Sungsang*.

Throughout the study, the currently accepted scientific knowledge and the view of Unification Thought on atoms, molecules, element, and compound are found to be compatible. Moreover, the notion of dual purpose for atoms and molecules is certain to provide the chemists with a new insight into these fundamental building blocks.

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