Molecule Aging

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Abstract: We propose a new concept of “molecule aging”, in which the molecules are treated by some special methods to produce some different properties but with no apparent structural changes of molecules. Such “aging” is different from the traditional concept of “aging” in which the breaking of chemical bond is involved. We hope the construction of new instrument platform with ultrahigh sensitivity and resolution and new theoretical model describing new aging molecules can induce positive effect in all kinds of fields, such as energy and life process.

1. Background

Molecules build the life in the world. Time and space are both the factors that change things. For human, it is inevitable that aging of skin due to the distinct structural changes, which is affecting not only its youthful appearance, but also its various physiological functions. That is usually called “aging” [1-3]. The materials in our day life can age like human body with the time and environmental changes, which can induce huge economic loss to daily life and national economy [4-8]. The traditional aging usually refers to the material aging with the properties by the change of the high-level structure or the degradation of polymer materials by the chemical bonds broken [9-10]. The present scientific cognition and characterization methods agree the same type of molecules without structure changes indicated the same physical and chemical properties. There is no difference in the same kind of molecules, i.e. no aging with the time and surrounding. Therefore, the traditional concept holds that even if molecules are treated for a long time, if the structure does not change with time, their intrinsic properties will not change. They just like new ones, without such aging. For example, the water molecules in the glaciers formed billions of years ago and the water we drink show the same structure with an oxygen atom bonding with two hydrogen atoms, and possessing the exactly same chemical or physical properties under the same condition. Moreover, for the conventional water treated by long-term "cooking", there is no change in the usual NMR, IR spectra for the treated water, as well as significant changes in macroscopic electrochemical experiments. So the results above would lead us to think that the treated water still retains all the characteristics of the water before treatment, without any property and structure changes. It means people all believe that the properties of a molecule are always the same as when its molecular structure remains.

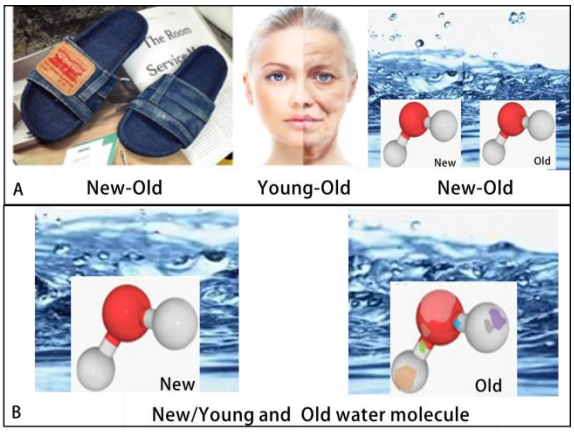

Figure 1. Traditional aging (A) and “the aging of molecule” concept (B).

2. The Feasibility

In this work, we propose a concept that a molecule could become “old” or tuned after it is treated with some special method. After its aging, its molecular structure is still the same as the fresh molecule, but some properties are different from those of the fresh ones. We propose that everything could become old, including molecules. For example, one pair of new shoes is the same pair after its being worn for some time although the appearance looks like old (Figure 1). During some special treatment, the molecules can keep their molecular structures stable before they are completely decomposed or transferred, however, some tiny changes occurs in the structure of the molecule, while such changes cannot be captured or revealed by the current traditional technical methods probably due to their lower resolution. While such tiny “unseen” structural changes can lead to the variation of some properties of the molecule. In addition, the same kind of atoms by the current theoretical method are thought to be no difference in physical and chemical properties, and all the existed principles and theoretical models based on this assumption above not only cannot explain such aging-induced property variation of the molecule, but also cannot study the theoretical dynamic process occurring on such aged atoms or molecules [11].

The characterization method cannot detect the tiny change in apparent structure and the composition for the deionized water in the lab by “cooking” at high temperature and press. We thought maybe the “cooking” treatment method is too mild to affect the stable structure of water, or maybe the detection methods are not sophisticated enough. So we treat the small methanol molecules by electron-attacking with a large current to speed up the aging process, and then test the electrochemical properties or other properties. Though there is nearly no change in the NMR and IR spectra for treated methanol and ordinary ones, we still find as shown in Figure 2 that the properties of the treated methanol can be electro-oxidized easier or faster than ordinary methanol molecules as indicated by their peak current densities. In other words, some changes in microscopic structures of the methanol molecules may occur after being electron-attacked, although such tiny change cannot be revealed by NMR or IR spectra. So here, we propose a new concept of “molecule aging” based our results. We speculate on this matter that every molecule, regardless of size, all can age, which is

different from the concept of traditional aging. It mains some physical and chemical properties can be changed without the change of apparent molecular structure defined by current knowledge, and maybe the properties of atoms themselves have changed. Because it cannot be explained in detail with current knowledge or theories, the concept of "aging of molecule" is brand-new now. However, the reproducible experimental results in our lab probably can confirm the rational of the concept of "molecule aging".

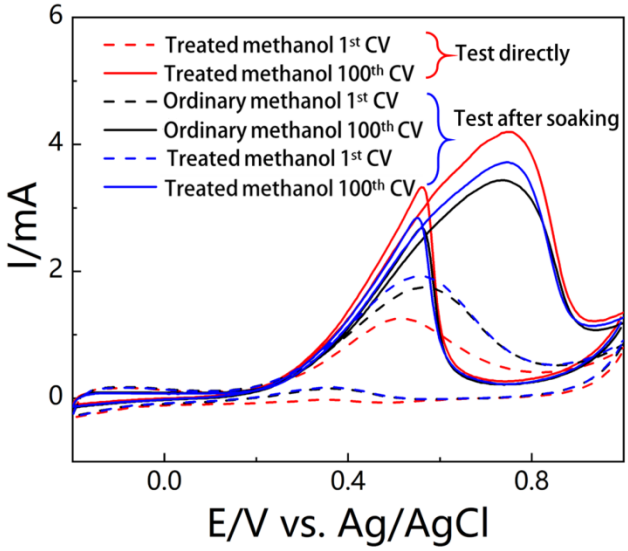

Figure 2. The polarization curve for methanol oxidation before and after electron-attacking treatment for methanol molecules.

3. Feasible Plan

Due to the lack of the current characterization methods and the theoretical models, we plan to take more drastic approaches and design new devices to improve the aging process of some small molecules. More importantly, we should develop new instrument platform with higher spatial and temporal resolution, which probably can resolve the finer microscopic characteristics of molecules. Through the combination with chemical reaction device, the catalytic chemical activity and the fluorescence nature will be investigated more deeply. In addition, the influence of the aging molecules in the living things such as activity and growth will also be researched. Meanwhile, based on the property of "aged molecules" with invisible structural changes, we hope to build new theoretical model to describe the same kind of atoms with tiny different charges and masses, which can be referred to investigate the different reaction kinetics and thermodynamics. The new theoretical model is to avoid the structural adjustment, but instead of the internal physical parameters. We can take one molecule with adjusting atoms (aging) as reactant, leaving other same molecules with initial parameters as environment of reaction; or keep one molecule as normal one, leaving other same kind of molecules with adjusting aging parameters. This unique concept breaks the shackles of conventional theoretical calculation and refines the influence factors of reaction from structure changes and different environments to the distinction of physical/chemical properties between the same atoms or molecules.

This kind of aging operation for the same kind of atoms can also explain why the final reaction process or activity is obviously different in the same solvent environment and the material with the same characterization results.

4. Great significance

Based on the key scientific questions about the relationship between internal fine structures and reaction processes, we develop an innovative concept called “molecule aging” to explain unusual process or mechanism of reaction that is inexplicable by normal theory. Based on this new concept, it will provide a new perspective to research the chemical process with the different degrees of aging molecules. According to the new concept, a theoretical model will be developed from the atoms themselves to distinguish the different physical and chemical properties of the same kind of atom or molecule, and a detection device with “molecule fingerprint” characteristics can be developed to further strengthen the unique performance of these newly discovered "aging molecules". If “aging molecule of fuel” can be obtained by some extreme treatment, possibly higher activity than normal molecules will lead to a major revolution in energy process. Then aging will boost the development of all kinds of fields, such as energy and life process, which will produce great significance and practical application value closely related to human being in future.

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