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Novel Chemical Species of Santilli's Magnegas in Hadronic Chemistry[1]

Sangesh P. Zodape*

*Department of Chemistry, Visvesvaraya National Institute of Technology, Nagpur – 440 010, India
E-mail: sangesh02@gmail.com

Abstract. In this paper we have reviewed the novel chemical species, the magnecules, synthesized by Santilli that comprises of individual atoms, radicals and ordinary molecules bonded through the magnetic attractive forces originating out of toroidal polarization of the orbitals of atomic electrons under strong magnetic fields. The main focus of this paper is to review the fabulous applications of **Santill's magnegas**. The novel magnecular species of hydrogen and oxygen find their place in fuel industry especially in fuel cells with the increase in its power, efficiency and total output. In this account we have also considered the flame temperature report of the new magnecular species of gases. We emphasize the importance of this new field.

Keywords: Magnegas, magnecules and hadronic Chemistry.
PACS: 21.10Dr

INTRODUCTION

According to an U.S. Department of Energy (DOE) release, about 74 billion barrels of fossil oil, corresponding to about four trillions gallons of gasoline, are consumed in our planet per day in an estimated number of half a billion cars, one million trucks, one hundred thousand planes, plus industrial, agricultural, and military uses. The combustion of such an enormous amount of fossil fuel per day has caused increasingly alarming environmental problems, such as: 1) Measurable emission in our atmosphere of the largest amount of carcinogenic and other toxic substances; 2) Measurable oxygen depletion in our planet due to the fact that the sum of the oxygen emitted in the combustion exhaust and that recycled by plants from the emitted CO_2 is smaller than the oxygen used in the combustion (negative oxygen balance); 3) Measurable increase of carbon dioxide of dramatic proportions, with potentially catastrophic climatic changes; and other environmental problems, such as the production of poisonous NO_x. The limitations of using hydrogen as the conventional fuel also had to be altered. Thus there arises a need of new species of hydrogen and oxygen called magnegases [1-6].

MAGNEGASES

The electromagnecules are clusters generally composed of individual atoms, parts of conventional molecules (including radicals) and normal conventional molecules under a new internal bond originating from the electric and magnetic polarizations of the orbits of at least some peripheral atomic electrons [1,7-14]. Electromagnecules are generally called Santilli magnecules[15-21]. The basic concept involved in formation of magnecules is that when an atom is exposed to sufficently strong external magnetic field acquire a toroidal distribution of electron charge with consequential creation of a magnetic dipole N-S caused by rotation of electron charges by toroidal polarization. Such a dipole gets aligned along the symmetry axes of the toroidal distribution so as to possess the magnetic properties opposite to the external ones. Atoms, radicals or molecules with toroidal polarization of their atomic orbits then bond to each other in chains of opposing polarities N-S-N-S- resulting in the formation of magnecules.

Simple calculations show that such a field is strong and 1415 times stronger than the intrinsic magnetic field of the nucleus of hydrogen. Thus toroidal polarization of orbits of peripheral atomic electrons creates a new field sufficiently strong to originate a new chemical species. An important feature of magnecules is that the magnetic polarization occurs in each individual atom rather than a molecule as a whole. This implies that the new chemical

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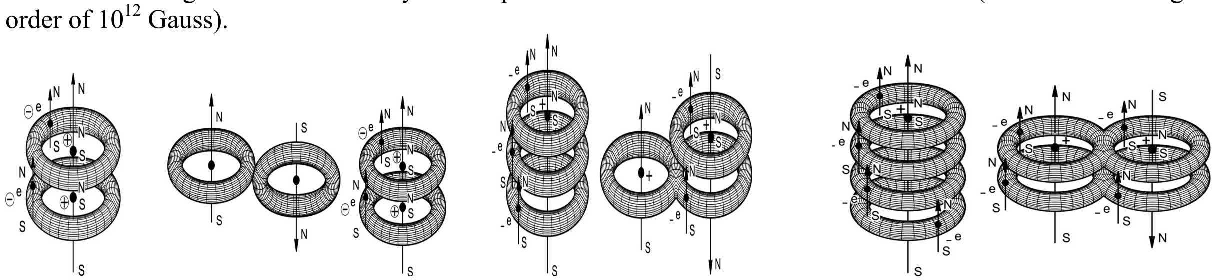
species of magnecules can be formed for all possible gases irrespective of whether they are diamagnetic or paramagnetic.

Thus the primary technological objective for the industrial production of substances with magnecular structure depends on the control of the space distributions of the orbits of individual atoms, rather than molecules. The new chemical species of magnecules most investigated till date is Santilli magnegas produced by recyclers called hadronic reactors of molecular type. This particular gas is produced by flowing a liquid feedstock (such as fresh water or salt water, antifreeze and oil waste, city and farm sewage, crude oil, etc) through a submerged electric arc between carbon base consumable electrodes[2,14,22].

MAGNEHYDROGEN

The new species is generically denoted MH and its individual clusters are denoted MH_n, n = 2, 3, 4, …. to specify the number of hydrogen atoms per cluster. Most of the environmental pollution is caused by fossil fuel is due to chunks (diatomic radicals) of uncombusted fuel that may be carcinogenic primarily because consisting of incomplete combustion of fuel. Therefore, Santilli has proposed and synthesized a new chemical species called as magnecules under strong magnetic field [1,4,5,10]. Santilli's magnecules are in gaseous, liquid and solid states consist of stable clusters composed of conventional molecule or diatomic radical with individuals atoms bonded together by opposing magnetic polarities of toroidal polarization of the orbit of at least the peripheral atomic electrons when exposed to sufficiently strong external magnetic fields, as well as the polarization of the intrinsic magnetic moment of nuclei and electrons [1,4,5, 10-21]. A population of magnecules constitutes a chemical species when essentially pure i.e. when molecules or other species are contained in very small percentages in a directly identifiable form. To our best understanding, the most plausible interpretation of the new species of MH is that originally presented by Santilli in Ref. [13], namely, a multiple of the specific weight under a high Hydrogen percentage is evidence of a new clustering of H-atoms which cannot possibly be of valence type due to the evident absence of the valence electrons necessary for a quantitative representation of the clustering of many different atoms. In essence, the new chemical species of magnecules can be defined as clusters of individual atoms (H, O, C, etc.), diatomic free radicals (HO, CH, etc.) and ordinary molecules (H_2, CO, H_2O, etc.) bonded together by attractive forces between opposing magnetic polarities of toroidal polarizations of atomic orbitals, as well as the polarization of the magnetic moments of nuclei and electrons (see a conceptual rendering of MH_n in Figure 1). Santilli first developed, the so-called PlasmaArcFlow™ Reactor, that converts various liquids into a combustible gaseous fuel known as MagneGas (MG). The gasification is achieved via a submerged DC electric arc between carbon electrodes that, under sufficient powers (of the order of 300 kW or more) is capable of producing at atomic distances the high values of the magnetic field necessary for the polarization of electron orbitals into toroids (estimated as being of the order of 10^{12} Gauss).



(a) (b) (c) (d)

FIGURE 1. Conceptual rendering of Santilli's magnecules. (a) Magnehydgrogen (MH), two hydrogen atoms forming a magnecule MH_2 (H×H), (b) A cluster MH_2 in MH composed of H-H and H×H molecules, (c) A cluster MH_3 in MH composed of the magnecular species H-H×H and H×H×H, (d) A cluster of MH_4 in MH composed of the magnecular species H×H×H×H and H-H×H-H (the species is H-H×H×H has not been shown).

THE HYPOTHESIS OF THE NEW CHEMICAL SPECIES OF MAGNEGAS

As explained earlier the hydrogen molecule is diamagnetic and so cannot acquire a total net magnetic polarity. But the orbits of the individual H atoms can aquire a toroidal polarization under a sufficiently strong external magnetic field .The important aspect for the hypothesis of MagneH and MagneO is that toroidal polarization of the orbits of the individual H atom along with the polarization of the intrinsic magnetic moments of nuclei and electrons in the hydrogen molecule is sufficient for the creation of the desired new chemical species with higher specific weight as new bonds can occur between the pair of individual H atoms [1,4-5].

The creation of MagneO is comparatively simple since oxygen molecule is paramagnetic thus having free electrons to acquire an overall magnetic polarity which is absent in the case of of MagneH. Thus to realize the corresponding magnecules it is necessary to provide suitable physical conditions and geometries for the joint polarization of the atoms that would favour their coupling into chains of opposing magnetic polarities.

Extensive studies of the above stated aspects have established that the primary attractive force responsible for the electromagnecules is expected to be due to the magnetic polarization of the orbitals of valence and other electrons, from space to toroidal distributions. Conventional quantum electrodynamics establishes the existence of such a polarization whenever atoms and molecules are exposed to the intense magnetic field, because it exists in the vicinity of the electric arc. Such a magnetic polarization creates magnetic North-South polarities along the symmetry axis of the toroid, which permit the stacking of atoms and molecules one after the other.

EXPERIMENTAL EVIDENCE OF MAGNEOXYGEN

We present the experimental evidence of existence of MagneO. It was for this purpose that Santilli with the help of technicians constructed a rudimentary apparatus that uses the automotive sparks powered by an ordinary car battery, the system operating at about 15psi. Two types of MagneO were produced and compared [1,4-5]. These types of MagneO were tested in place of ordinary oxygen in a 2-cell proton exchange membrane fuel-cell operated with conventional high purity hydrogen. The membrane material was Nafion 112, the catalyst in the electrodes was platinum coated on carbon; the plates for heat transfer were two nickel/gold plated material; the temperature of the fuel-cell was kept constant via conventional cooling means; the current measured via a HP 6050A electronic load with a 600 W load module; a flow rate for oxygen and hydrogen was maintained for every measurement of current; both oxygen and hydrogen were humidified before their entry into the cell; the measurements reported herein were conducted at 30^0C.

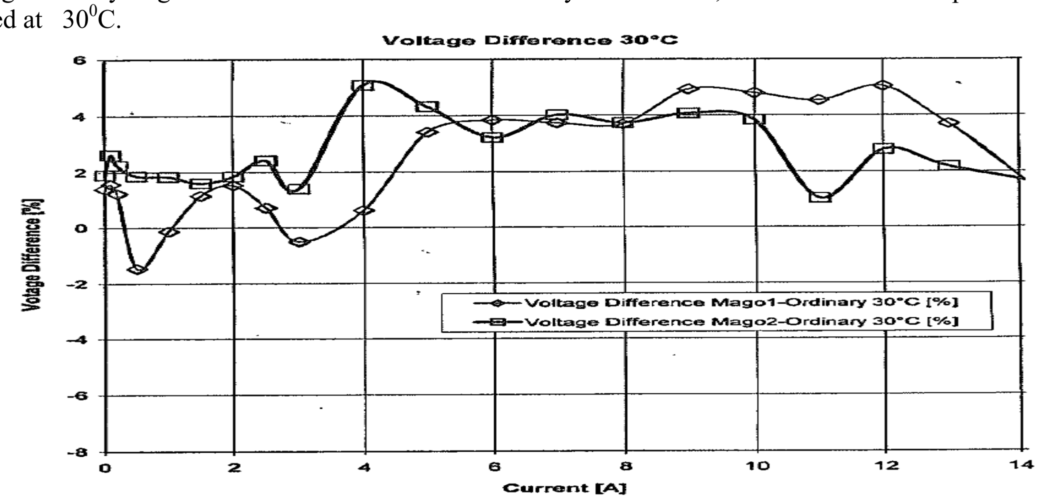


FIGURE 2. A schematic view of the voltage increase in a test fuel-cell operated with ordinary pure hydrogen and the two samples of magneO produced by rudimentary equipment.

The measurements show an increase of the voltage, power and efficiency of the order of 5% as compared to the measurements when the cell was operated with MagneO1 and MagneO2. The increase was consistent for both samples except differences within statistical/experimental errors.

For the appraisal of these results it is necessary to note the experimental conditions as specified above. By comparison we get a vivid idea of the industrial production of MagneO that can be produced by employing an array of arcs each operated with continuous currents of thousands of psi. It is evident that the later conditions are expected to imply a significant increase of the performance of the fuel cells when operated with MagneO.

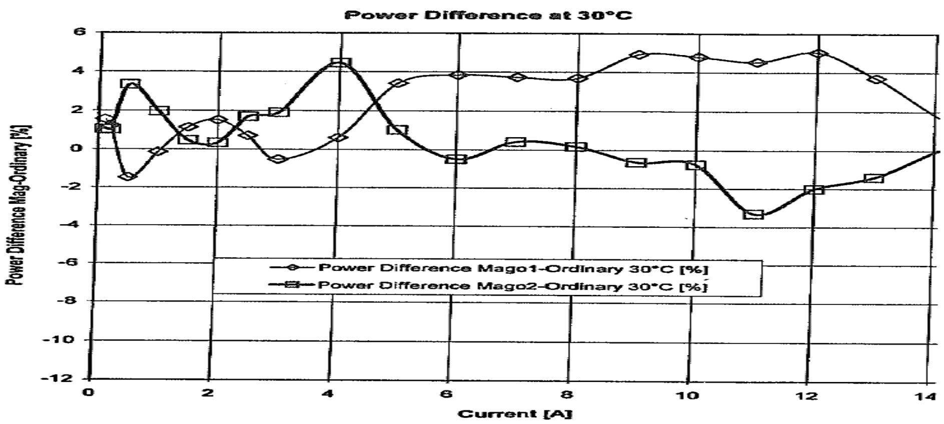


FIGURE 3. A schematic view of the power increase in a test fuel cell operated as in Figure 2 confirming the results of the latter.

ADVANTAGES OF MAGNEGASES

Magnegases can be used in the firing of a ”multi-stage rocket”, with different fuels in different stages. Magnegases find extensive applications in fuel industry. It is like the nectar of immortality which provides the inexhaustible source of the fuel gases which increases its power, efficiency and total output [23]. Confirmation of the energy efficiency of the magnegases that has been supported by the experiments performed by Magnegas Corporation using emissions to measure the spectra from flames of Magnegas to determine the emission lines and temperature of Magne gas[24]. Two kinds of flames had been subjected to experimentation, Intensity of MG flame from antifreeze combined with oxygen was much higher than that of crude oil combined with oxygen. The temperature of the both the flames was computed using Weins Law for the peak of each flames spectrum. The MG flames were evaluated at 10,500 F in temperature. The distribution is non-black body like. Non H emission lines were visible which indicates unknown elements in MG.

CONCLUSIONS

In preceding sections, we have described in brief aspects of magnegas in hadronic chemistry. The aspects those covered in brief herein are the basics of magnecular interactions and some applications of magnegases. The magnecules are pollution free fuels because it provides stored magnetic energy without the molecular bond cleavage. Magnegases finds application in metal cutting process. It is possess great metal cutting metal capabilities which is attributed to the exceptionally high flame temperature. This magnegases are marvellous energy suppliers for powering automobiles and rockets. Therefore, the Flame temperature report of the new magnecular species of gases that actually emphasizes the importance of this new field [24].

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