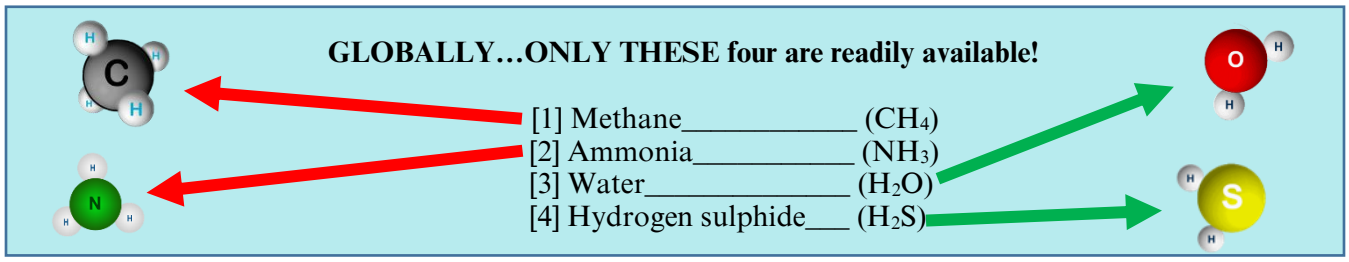
BIO-H_2-GEN Inc.
THE INFINITE ENERGY CARRIER
THE INFINITE SOURCE
1687 Harten Lane, Kingston, Ontario, Canada K7L 4V1
HYDROGEN SULPHIDE

A synopsis of BIO-H2-GEN Inc.'s "Knapp Process"

It's fast becoming acutely critical to replace the energy carrier fossil fuel with the alternative energy carrier hydrogen gas (H_2). Our hydrogen, when in production, will not involve carbon and will not emit deleterious chemicals into the atmosphere on usage in a proton exchange membrane fuel cell (PEMFC). We believe our Knapp Process is destined to be one of the major processes for producing the alternative clean energy carrier, hydrogen gas, to replace hydrocarbon combustion. There are only four simple compounds, from which to extract a distributed energy carrier… Hydrogen Gas (H_2).

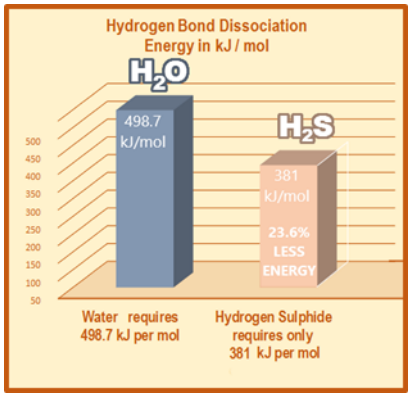


The first, (CH_4), is the current favourite but cannot be sustained because of Climate Change and toxic emissions on its combustion and there is a finite natural supply of it. If CH_4 is produced, using aerobic bacteria in wastewater treatment infrastructures, that method produces as much CO_2 as CH_4 and then when the CH_4 is used in internal combustion engines (ICE) that produces more CO_2.

The second is ammonia (NH_3). It can produce very toxic emissions and should be retained for its value in the production of fertilizers.

The third, (H_2O), is the current choice for hydrogen. However, the caveat is that it takes more energy to remove the hydrogen from oxygen than is returned using a proton exchange membrane fuel cell making it negative energy. Albeit, excess electricity, from renewable sources, can be used for the electrolysis of water to produce hydrogen.

The fourth, (H_2S) our choice, ubiquitously permeates city wastewater in its dissolved state. H_2S is our target in its dissolved state. We apply the zero-carbon "Knapp Process". We do not have to explore, drill or dig for or transport our product over long distances. Our global choice is readily available and can be sourced in existing municipal wastewater infrastructures that are distributed throughout the world.



Renewable electricity from solar and wind is stored for electrolysis of water to get H_2. However, it requires more hydrogen to produce equivalent amps of electricity in a PEMFC.

Energy to remove hydrogen from H_2O is **498 kJ/mol**. energy **negative**

Energy to remove hydrogen from H_2S is **381 kJ/mol**, energy **positive.** Our target choice is **#4;** hydrogen sulphide (H_2S). We also use electrolysis to obtain the hydrogen but we dramatically increase the yield of hydrogen by the patent-pending process that includes a novel influence in proximity to the cathode.

William Knapp, inventor of the technology, assigned the rights to BIO-H2-GEN Inc. With the completion of our pilot plant project, the existing wastewater infrastructures will enable rapid deployment of the "Knapp Process" technology which is destined to become the cost effect and distributed source of zero-carbon and

clean hydrogen available to every municipality that has wastewater treatment infrastructures and applies the "Knapp Process".

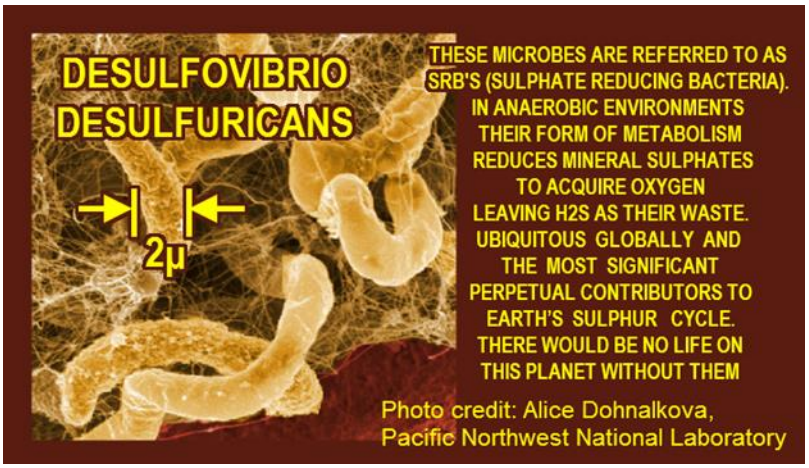
The patent pending "Knapp Process" will simultaneously remove hydrogen from dissolved hydrogen sulphide (H_2S) and, as a result, we proportionally reduce the cost of the chemical and the physical oxygenation of wastewater; a win-win for using the Knapp Process.

Since typical wastewater processing is in millions of litres a day, as little as 4.0 mg of dissolved H_2S per litre could enable larger communities to produce millions of kilograms of "zero-carbon" hydrogen annually and cut tens, if not hundreds, of thousands off their H_2S treatment costs.

How sustainable is the source of hydrogen sulphide (H_2S) from bacteria?

Sulphate Reducing Bacteria (**SRB's**) are ubiquitous throughout the world and thrive in ALL anaerobic environments that contain nutrients for their propagation. Other scientists contend that they have been part of Earth's life cycles for 3.5 billion years and that there would be no life on our planet without them.

Wastewater, from mining, for example, can also contain dissolved sulphides.



The bio-availability is influenced by the pH, the redox potential, and the loading of organic carbon that is present. The Dead Sea apparently has been calculated to contain trillions of kilograms of hydrogen sulphide H_2S in its' anaerobic depths.

The patent pending "Knapp Process" will initially target the dissolved H_2S that permeates all global wastewater treatment infrastructures. Currently, H_2S is an undesirable contaminant because toxic H_2S gas is produced by SRB's, in significant quantities, from their respiration during the breakdown of organic carbon nutrients. H_2S, from SRB's, forms SO_2 on contact with the oxygen in the air. There are further reactions, in three steps, with H_2O, H_2S, and O_2 resulting in H_2SO_4 (sulphuric acid a.k.a. acid rain) which erodes the wastewater infrastructure.

However, as municipalities begin to license the "Knapp Process" then hydrogen would be removed from the H_2S rendering it unable to form the H_2SO_4. It will significantly reduce the production of SO_2 that is currently the product of their chemical and physical aeration oxygen treatment of H_2S. A municipality's SO_2 release into the air is destined to be subjected to environmental regulations because of the ultimate formation of acid rain.

BIO-H2-GEN Inc.'s "Knapp Process" does not require exploration ($$'s); does not require drilling into the earth's mantle ($$'s); does not require transportation ($$'s) that are associated with delivery from centralized production facilities. My hypothesis of improving the yield of hydrogen was validated in a batch experiment. Utilizing a $30K investment we built a small chemical laboratory complete with a fume hood. Knapp designed and fabricated a twinned glass apparatus that enabled running, simultaneously, an electrolysis experiment whereby one of the twinned halves of the glass apparatus remained as the standard "control" side and the twinned side having identical sourcing of electricity and other parameters identical in influence.

There was an additional influence consisting of **a novel influence to the cathode of the BIO-H2-GEN Inc.'s side.** The anticipated increase in yield provided a surprising 38.5% increase in hydrogen gas. That significant yield increase has encouraged us to advance to a pilot plant phase that will provide the means to run the "Knapp Process", not as just a batch experiment but continuously 24/7 generating the engineering scale-up data required for construction of full-scale operations.

BIO-H2-GEN Inc.'s "Knapp Process" targets the global community's dissolved H_2S in existing wastewater streams using a novel electrolysis reactor and incorporating a novel influence that controls the streams of H_2S. With access to wastewater, it is recycled through the hydrogen production steps; rendering a problem contaminant (H_2S) into a clean zero-carbon energy carrier (H_2) for use by PEMFC electric vehicles (EV's) and, reducing the costs associated with controlling the H_2S.

BIO-H2-GEN Inc., seeking equity support, has begun the design steps towards building, testing and operating a modular pilot plant. The pilot plant affords us an opportunity whereby we will generate the engineering scale-up data for full-scale hydrogen production facilities in those global wastewater treatment centres employing the "Knapp Process".

Targeting hydrogen sulphide in municipal wastewater treatment streams for the production of "zero-carbon" hydrogen gas will enable communities, simultaneously, and significantly, to reduce their biological and chemical oxygen demand (BOD & COD) costs that, for some communities, run into millions of dollars.

BIO-H2-GEN Inc. targets ubiquitous dissolved H_2S in city wastewater to produce "zero-carbon" clean energy carrier hydrogen gas for use in proton exchange membrane fuel cells (PEMFC) electric vehicles (EV's). A city of 150K could produce 3M kg of "zero-carbon" hydrogen annually and simultaneously reduce their BOD and COD costs. We are seeking the support of approximately $3.5M CAD CapEx & OpEx for both a pilot plant to establish engineering scale-up data and to file patent applications in those selected countries signatory to the patent cooperation treaty (PCT). That PCT application was filed June 20th, 2016 a year after a US provisional filing on June 19th, 2015.

We have identified a Canadian company, Zeton Inc., with a 30-year history of designing, building, testing and delivering "turn-key" modular chemical pilot plants along with training for the operators. Another firm, Mettler-Toledo have experience working with Zeton in providing some of the key monitoring instrumentation. I have over 35 years' experience with Dupont Canada's Research and Development Laboratories and I am very familiar with S.C.A.D.A., along with other analytical techniques and procedures.

There is an urgent global need for a 'zero-carbon' hydrogen. The funding just for our phase two pilot plant is approximately $ 3.5M CAD which would include 18 to 24 months of operation. Our successful pilot plant will facilitate the sale or license of the "Knapp Process". Canadian sources of public support require "meat" in the game as well as financials. However, because our innovation is not fully developed, and thereby is without a revenue stream, our lack of financials, perceived as high risk, precludes government support. Our innovation, therefore, is still in need of funding in order to generate the "financials" that are required to fund the development of the innovation…"A Catch 22" with government funding in Canada.

With our Phase two funding in hand, we would then qualify for up to 50% grant funding that would be released to mitigate the costs from pertinent invoices associated with the phase two program. We seek an equity partner(s) that recognizes the enormous potential R.O.I. of our disruptive "Knapp Process" technology and has the capability of supporting the next development pilot phase for global positioning**.**

"The Hydrogen Generation Market will be worth 152 Billion USD by 2021". (Source: Markets & Markets)

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