COMMENTS ON AQUAFUEL

Horace Heffner - 11/20/96

An "Infinite Energy" (IE) article on AquaFuel leaves the impression that the AquaFuel process may or may not be o-u once you consider the chemical energy that would be released by simply "burning" the carbon. In other words, you start with electricity, carbon, air and water and produce fully oxidized products. The total energy balance was not analysed in the article. The comparison was between the electrical energy input and the output energy. As to the recent silence about AquaFuel - that could either mean no interest, or very much private interest. Let's take a quick look at it.

Here are some numbers from the Energy Technology Handbook, Consodine, McGraw-Hill (1977), p. 9-38 that may be of interest:

Reaction	Output per pound of fuel
2C + O2 -> 2 CO	4,000 BTU
C + O2 -> CO2	14,100 BTU
2CO + O2 -> 2CO2	4,345 BTU

It was noted in the IE article that one pound of carbon plus one kilowatt of electricity produces 80 ft^3 f gas, or 134,000 BTU's. Since 1 BTU = 1,055 J = 1055 watt seconds, 1 BTU = 0.293 watt hrs., or 1 W-hr = 3.412 BTU or 1 KWH = 3,412 BTU.

Now, the total input (excluding the water, assumed to be in ground state) is therefore 14,100 BTU (carbon) plus 3,412 BTU (1 KWH), or 17,512 BTU. Unless I have a big mistake here, like confusing some strange BTU type, misreading the article, or making or calculation error, etc., which is very possible, that is a COP of over 7 (i.e. 134,000/17,512 = 7.652). It could be even better if you consider the heat released by the arc.

Something that I think is attractive about AquaFuel is the prospect of producing the carbon directly from the atmosphere. This could be done using nuclear energy or renewables like wind. CO2 could be removed from the atmosphere and the carbon separated from the CO2 electrochemically. Such a process might be especially efficient here in Alaska where, further North, it is often -40 deg. F and the wind blows continuously. The carbon is much easier to store and transport than hydrogen. Further, maybe the process will work with coal directly, or if not, then processed coal. If pollutants from coal could be reduced to anywhwere near the level shown for burning AgauFuel made from pure carbon this would represent a major step forward

for coal, environmentally speaking, even though CO2 would still ultimately be produced.

One thing that bothers me about the composition of AquaFuel is that it seems like it would be unstable. Here is the composition noted in IE:

Compound	Percent
Hydrogen	46.483
Carbon dioxide	9.329
Ethylene	0.049
Acetylene	0.616
Oxygen	1.164
Nitrogen	3.818
Methane	0.181
Carbon Monoxide	38.370
Total	100.015

It just seems that the CO will eventually combine with the oxygen and/or itself to form CO2. There are also various hydorcarbons that could form spontaneously with a net release of energy. I just do not see how this gas could be stored for long periods, especially under pressure. It seems like the stuff ought to even be able to polymerize.

USES OF AQUAFUEL GENERATION PROCESS

There are lots of possibilities for processing AquaFuel. One is to extract the CO etc. by liquefaction, and save the H2, burn the CO to run the plant. Another possibility is coal gassification, turning coal into methane, which typically begins by creating water gas. There are existing tested technologies for coal gassification that are not yet economically feasible, but will be eventually. There are existing technologies for shipping LNG and distributing methane. Another possibility is to futher process the gas into fuels like octane, or into feedstocks for plastics.

Another thought, especially if this is an o-u process, is to attempt it using CO2 gas to feed the arc instead of carbon. Use hollow metal electrodes to feed the CO2 gas into the arc. This would greatly simplify the process if it worked. Since the fuels supplied would be in ground state, the enegy supplied would then be that of the arc. There are many possibilities for processing CO2 chemically.

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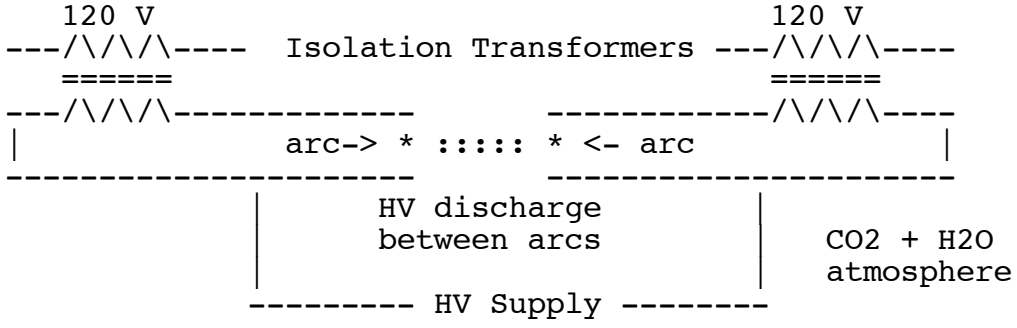
Coming up with economic data would require a significant engineering effort.

Some more thoughts - mix steam and CO2 and feed to the arc. Maybe you don't need to put underwater. Could use a sealed chamber to enclose the arc, with piston or turbine feeds into and out of the chamber to recapture the heat energy. Might be useful to use resistance element preheated electrodes to generate the arc.

Synthesizing - why not combine the attributes of PAGD and Water Gas. Use molybdenum electrodes with CO2 and water vapor for the gas. The thinking behind this is basically that if there is an o-u characteristic to carbon and water in an arc, such a characteristic should show up in an arc through CO2 and H2O because, in part, these ground state ingredients will decompose in an arc. It may even be possible to combine a low voltage arc in the same enclosure with PAGD type electrodes. The HV PAGD oscillations should get an extra kick from the oxidation of the products created in the arc.

Combustion could be triggered immediately in the environment of the arc:



The HV supply could be high frequency HV to create an ionizing spark discharge to ensure oxidation in the fringe area of the arcs. The arc circuits could include rectification if necessary. The arcs could be fed CO2 and water vapor if necessary, i.e. if not sufficiently available in environment of enclosure. Possibly one of the arcs could be replaced by a metal plate. Such a plate maybe could be made a cathode plate and DC used in the power supply to increase the gas yield. The objective is to generate excess heat with this device and directly recycle the CO2.