

Re: Questiona and thoughts about CO2

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- *From:* The Ghost In The Machine <ewill@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>
 - *Date:* Tue, 10 Jun 2008 19:54:24 -0700
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In sci.physics.relativity, Jimmy
<jalively1971@xxxxxxxxxxxx>
wrote
on Tue, 10 Jun 2008 07:51:55 -0700 (PDT)
<9814ca48-b323-4a4b-b7fb-97a40bce67e2@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>:

How difficult is it to split CO₂ into C and O ?

Bond enthalpies are available all over the Web.

Most likely you want diatomic oxygen and carbon in the form of graphite.

The C=O bond has -1076.5 kJ/mol; the O=O bond -498.36 kJ/mol.
(The negative value indicates that forming the bond liberates energy. Unfortunately, the values are approximate.)
The C-C bond is -607 kJ/mol.

This means that one needs $(1076.5 \times 2 - 498.36 - 607)$ kJ/mol O₂
= 1047.64 kJ/mol O₂ as an absolute minimum amount of energy; in technical chemical terms this reaction is endothermic.

In practice I surmise the energy needed is considerably more, since thermodynamics is most likely involved. Best I can do there is note that a leaf appears to be a miniature Carnot engine, and therefore one has to consider hot and cold sides. A delta of 10 degrees Celsius in 300K would yield an efficiency of 3.3% -- which is apparently roughly corroborated by biodiesel yield studies.

This energy, of course, has to come from somewhere. For the leaf, a combination of sunlight and water transpiration will do.

If there were an effective way of splitting this molecule then we

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would be able to make Carbon into a solid (or Diamonds...heheh) and Oxygen to breathe.

There are a number of methods; I'd have to look. Synthetic diamonds are manufactured in bulk already.

OR

maybe we could store it in tanks, adjust the concentration, and use it as fertalizer in the rain forests, or maybe even on the Corn that everybody seems to be starving for.

Fertilizer is not carbon, but ammonium nitrate; two extra ingredients are needed. Hydrogen does not appear in nature so will have to be extracted from water; gaseous nitrogen is not easy to work with and can lead to some dangerous chemicals like cyanide ($\text{H}-\text{C}\langle\text{triple}\rangle\text{N}$), nitric acid (HNO_3), and of course ammonia (NH_3). More sophisticated chemistry can lead to explosives such as trinitrotoluene and nitroglycerin; fortunately, I don't think you'll need benzene or glycerol as an intermediary here.

Many things have carbon in them. Perhaps we can fuel that industry (so to speak). Instead of minning coal, we could retrain those people into jobs where the "Coal" is manufactured from carbon and waste (similar to the manufacturing of wood pellets for stoves). No more digging, and if a cycle were created then there would be no more or no less carbon being produced by Coal burning than is currently present in the atmosphere. Of course, implementaion would no doubt be costly and not many companies are going to be willing to shell out the extra cash. My point is that by just capturing and burying CO2, were not getting rid of it, We are just setting the stage for it to be someone elses problem. We need a way to recycle it into something usefull.

I'll admit CO2 sequestration doesn't make a whole lot of sense to me either. One possibility: build massively large ponding areas, which can grow lots of algae (the ocean seems to be slowly converting itself into salty seltzer water anyway, unfortunately). Unfortunately, the stink would be horrendous.

(Someone is constructing hardware that can take algae, tilt it vertically, feed it sunlight, and generate oil. O2 is a byproduct, presumably. If conditions are sufficiently controlled the stink

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might not be a problem — presumably it's dead algae that fouls the air during blooms.)

Unrelated: There seems to be a formula for energy production. Energy Output is directly proportional to the risk involed. (More risk, more energy) Observe:

Fusion Power "The stuff that powers stars" (Scale of destruction if gone critical, I honestly do not know), I think China was the closest in creating a viable Fusion plant.

Nuclear Power: (Meltdown. Depending on size, atmospheric contamination, uninhabitable zones miles across lasting for decades, Depending on location, massive loss, or damage to life and local ecosystems)

Hydrogen: Extemly volatile, a cell could cause a decent size explosion, however, it would be contained to the community that housed the cell.

Fossile Fuels: (all of em) If one of these explodes, the damages are mostly confined to the local community (not incuding economic damages or the losses expected due to mining)

Hydroelectric: If a dam goes, everything downstream is at risk, but everyone else would be safe

Solar: If a solar cell breaks, i suppose it could be repaired or re-manufactured, if a battery explodes, it would be pretty confined without nearly as much damage as the alternatives. However, energy output is low and at the mercy of the weather. (unless in orbit, then you need a way to get the energy to earth.)

Microwaves. Better hope the antenna's aimed correctly. ;-)

Wind: If someone is standing under a windmill when it breaks, well that could be dangerous I guess. Maintainence would be the greater cost with this method I suppose. Has the same disadvantages as solar.

There's also some risk to birds.

Weather happens everywhere, but certain types of weather targets some areas more often than others. A study of the weather patterns for the

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last 100 years could point to the areas where:

a.) the wind is strongest and most consistent (and accessible, it would be very difficult, for example, to put windmills on the tops of all the mountains)

More likely mountain passes, and many of the good ones are already sprouting fan forests.

b.) the sun is the strongest with the least clouds (Desert areas of the US, the African Sahara) Unless in orbit, then, just keep the planet out of the way :)

Reconciling that requirement with beaming to a fixed point (which would require a geosynchronous orbit -- a very hot commodity for communications reasons) might yield some issues. The good news: the geosynchronous orbit is tilted much like Earth is, and cessation of power would only occur once a day anyway.

The problem is that it will call for global co-operation. For example, Africa decides that they are not going to share their solar energy. What then? Not to mention, you can't make bombs out of it, so the military won't be interested until all the petro is GONE.

Well, those are my thoughts anyway, any other ideas?

Well, you missed geothermal, tidal, and wave energy, though I don't think those will be major contributors anyway.

Star

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#191, ewill3@xxxxxxxxxxxxxx
Linux. Because Windows' Blue Screen Of Death is just way too frightening to novice users.
** Posted from <http://www.teranews.com> **