Carbon Capturing

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Calcium Carbonate [CaCO3] is a commonly found chemical compound that has the ability to be transformed into a substance that will readily absorb Carbon Dioxide [CO2] from ambient air and free flowing water. In recent years [CO2] has been known to be one of the most dangerous gases present in the atmosphere and has caused oceans pH to drop as well as a global rise in temperatures. [CaCO3], when heated, forms Calcium Oxide [CaO], a sorbent1, and a byproduct of [CO2]. The [CO2] released from the reaction is captured in [H2O] to create Carbonic Acid [H2CO3]. The [CaO] will readily dissolve in water creating Calcium Hydroxide [Ca(OH)2], a more powerful sorbent1 than [CaO]. [Ca(OH)2] captures [CO2] that it encounters, with no addition of energy. After the collection of [CO2], [Ca(OH)2] becomes [CaCO3] again. The [CaCO3] formed can be heated again creating a cycle2 that will lead to a net decrease in [CO2] present in the atmosphere. The proposed sorbent will not only work to capture atmospheric [CO2], but will also work in deacidifying oceans. The cycle2 illustrated and depicted in the paper reduces approximately 0.43966 grams of [CO2] for every gram of [CaCO3] used; simply a 1 mole to 1 mole ratio was calculated between [CaCO3] and [CO2]. Removing all of the [CO2] in the atmosphere would be devastating to numerous organisms, implying that the number of cycles2 will be far lower than the estimated value of approximately 80 billion. The proposed Calcium cycle2 produces large quantities of [H2CO3] which can be used in production of goods for consumption, and in electrolysis reactions to create carbon nanofibers. The cycle2 can be industrialized and can be utilized to create a small amount of energy while also reducing [CO2] levels in the atmosphere.

Awards Won: