IOSR Journal of Engineering (IOSR JEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 57-61

Reduction of Carbon Di Oxide (Co_2) In Specific Area

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Abstract: *Carbon di oxide captured from air would reduce the effect of carbon di oxide emission to the atmosphere .We are presented a specific approach in which common salt is utilized and electrolysis is conducted. After electrolysis, Sodium Hydroxide is formed which react with carbon di oxide captured from air or reciprocating compressor and we will get washing soda as a byproduct. Washing soda can be used as house hold uses as well as many industrial uses. Thus through this project not only harmful carbon di oxide is reduced from the air and useful product is also obtained.*

Keywords: *Brine Solution, Carbon Di Oxide, Chamber, Valve, Reactions*

I. Introduction

Concern over climate change is driving innovation in technologies for stabilizing the carbon di oxide concentration in the atmosphere. Here we describe the new technology for capturing CO_2 directly from atmosphere and that has a cost that would allow its widespread use in managing the anthropogenic carbon cycle. Air capture technology provides an important new tool for carbon management, making it possible to consider carboneous energies carries in situation where their use would otherwise have to phase out. Air capture can compensate for emitted CO_2 by capturing an equal amount of CO_2 at different time and location .Air capture is independent of the sources of emission and so can be applied t any source. Air capture applied at a large scale can reduce the CO_2 concentration in the atmosphere, thereby making the current excursion in greenhouse gas concentration temporary. Finally, capture of CO_2 enables the closure of the carbon cycle by recapturing CO_2, so that it can again serve as the chemical feedstock that provides carbon for fuel synthesis. The other inputs are water, which provides hydrogen and energy from a source that is carbon free.

Why harmful gases are so dangerous?

1: Understanding global warming and greenhouse gases:-

The earth is surrounding by a cover of gases as atmosphere. This atmosphere allow most of the light to pass through, which reaches the surface of the earth. This light from the sun is absorbed by the earth surface and converts into heat energy. This heat energy is re-emitted by the surface of the earth during night. Due to unnecessary presence of some gases in the air, From the earth surface this scope of heat is prevented, because of this heating of earth take place so called "Greenhouse gases", and these greenhouse gases are harmful to the environment.Over the last 1000 years temperature remained remarkably stable across the globe, changing by little more than two degree Fahrenheit on an average. Even during the 'Little Ice Age', which lasted from the1300 A.D. to 1850 A.D. which resulted advancing of glaciers, average temperature were little more than 2 degree Farehnite .The effect of global warming would change average temperature five times as much as little ice age did through in the opposite direction. Over the next century, the rate of the effect of global warming should follow a steep upward curve.

2: Rise in global warming Ocean might have become saturated with our emission –An alarm bell:-

At the time when the industrial revolution started, the level of the CO_2 in the environment was approximately 280 parts per million by volume (ppmv) but it is increased about 380ppmv due to our burning of fossil fuels. Because of tremendous rise in CO_2 (about 35% rise) the global warming scenario has been detoriated or faster. The melting of arctic ice, severe climate changes are some of the effect among many of the global warming. This unexpected growth of CO_2 level in the atmosphere, scientist suspect is due to mainly two reason.

a) Inefficiency in the use of fossil fuels which increased the CO_2 level by 17% and

b) Other 18% came from a decline in the natural ability of lands and oceans to soaks up CO_2 from the atmosphere.

3: Expected impact of global warming would certainly be very harmful and dangerous:-

A large body of scientific studies, exhaustively reviewed has produced a long list of possibilities of impact of global warming. Nobody can say that any of the items on the list are certain to happen. But most of the climate experts agree that the impacts listed below are more likely to happen. The perfect timing for them are difficult to predict but they thought that, if humanity manages to start restraining its emission within the next few decades, so that greenhouse gases do not increase beyond twice the preindustrial level (we are already 35%beyond it and increasing each year) the result would certainly be very harmful probably including a radical reorganization of many of the ecosystem that sustain our civilization.

4: Faster ocean warming due to climate change-one of the reason of catastrophic sea level rising:-

5: In global warming only one degree increase in the temperature of the world's ocean is comparable to 1.4 billion one mega ton atom bomb.

We all know, the earth is surrounding by a cover of gases as atmosphere. This atmosphere allow most of the light to pass through which reaches the surface of earth. The earth surface absorb light from the sun and converts into heat energy. During night, the earth surface re-emit the heat energy. Due to unnecessary presence of some gases in the atmosphere, from earth surface this escape of heat is prevented, because of this heating of earth is taken place which is called 'global warming'. Each one degree rise in the temperature of the world's ocean is the equivalent to 1.4 billion one megaton atom bomb means a lot of energy. This tremendous amount of devastating energy, generating because of our faulty creation "global warming" is responsible for the present climate change.Thus it should not be so surprising that the result is more extreme weather more rain, more storm, moredrought.Therefore, our mainresponsibility is to enhanceindustrialization which emit less carbon di oxide.

II. Components Of The Device

i. Common salt chamber ii. knife gate valve iii.Measuring cylinder for common salt
iv. Water chamber v. non return valve vi. Measuring cylinder for water
vii. Timer operated electronic valve viii. Brine solution chamber ix.Mechanical stirrer
x. float valve xi. Chloralkali chamber xii. H_2 CO_2 and Cl_2 chamber

Different types of valves:

i) Knife gate valve ii) Float valve iii) non return valve iv)Timer valve

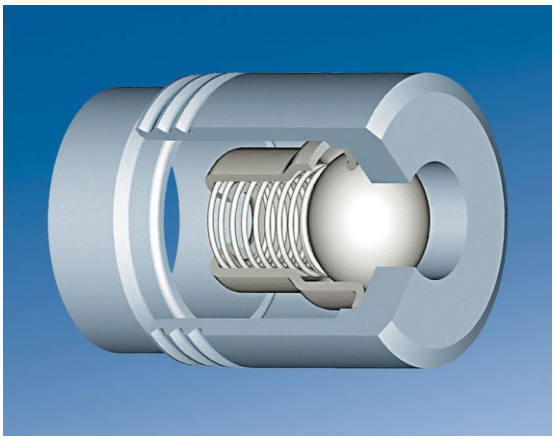
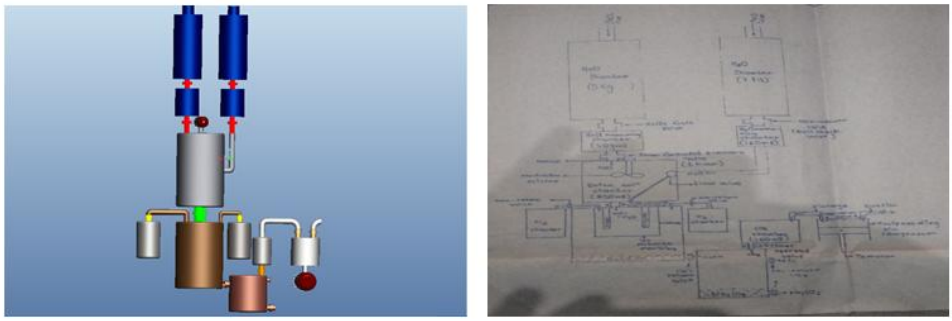


Fig.1. Non return valve

Fig.2. Timer valve

Complete design of our Devise



(a) **(b)**

Fig. 3 (a) Design of device using Pro-E (b) Manual Design

III. Methodology

- We used a 24 volt AC to DC converter to power supply.
- In the electrolysis chamber we used a metal plate as cathode and pencil as anode.
- Then we performed electrolysis with brine solution and thereby converting it to Sodium Hydroxide solution.
- We passed CO_2 gas from air by capturing it through a reciprocating compressor.
- Hence our final product Na2CO_3 was formed.

Reaction of the process:

- **$2NaCl + 2H_2O$ ----------> $Cl_2 + H_2 + 2NaOH$**
- **$2NaOH + CO_2$ ----------> $Na_2CO_3 + H_2O$**

Function of components:

i) Common salt chamber is the chamber where user provide the first basic ingredient of the reaction NaCl. This chamber has been designed to accommodate 5 kg of common salt. This chamber can accommodate salt for 6 days, and it has a salt measuring cylinder for NaCl has a capacity 40gms.This chamber has work of releasing salt into the brine solution chamber for further reaction.

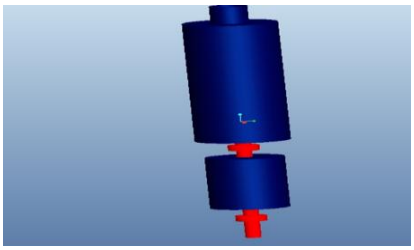


Fig. 4. common salt chamber with measuring device

ii) Water chamber is used to store the water which will be used for the first reaction. It can hold 7 lit of water. This water will supply for 6 days with measuring water tank of capacity 160ml it has valve to control the flow of liquid, from this chamber it will go to the brine solution.

iii) Brine solution chamber has the capacity of 250ml. This is used for mixing water and salt, this chamber has a mechanical stirrer fitted to it.

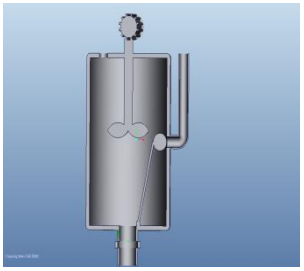


Fig. 5. brine solution chamber.

iv) Chloralkali chamber is used because it has several advantages like, it require low energy consumption, no environmental pollution by mercury or asbestos, high product purity,ease of handling and operation and low investment and operating costs.

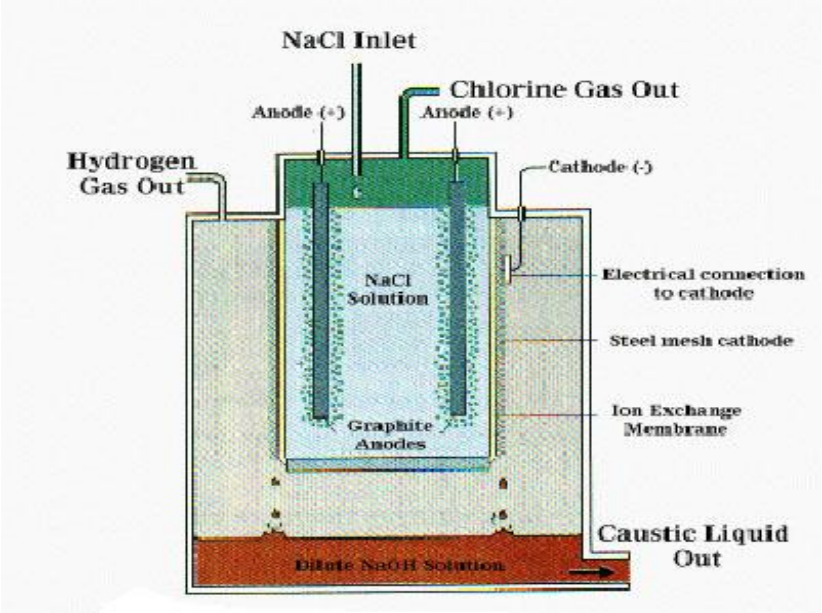


Fig. 6. Chloralkali chamber

v) Compressed CO_2 air comes from reciprocating compressor and it can be stored, in this chamber non return valve is also provided.
vi) At last by product chamber is provided. In this chamber Sodium Hydroxide which is by product of chloralkali method reacts with pressurized CO_2 and finally Sodium Carbonate (washing soda) is formed.

IV. Advatages Of This Work

- Basic raw material (NaCl salt) and water is very cheap.
- It can be used anywhere like in automobile as well as in industry.
- It's by product is not harmful and it can be used.

V. Uses Of By Product

a) soda ash/sodium carbonate-

- Glass manufacture.	- Sodium based product.	- Sodium based product.
- Sodium based product.	- Sodium based product.	- Detergent.
- Water treatment.	- Pulp and paper.	- Pulp and paper.
- Pulp and paper.	- Dyeing.	- Textile processing.

b) Chlorine can be used in

- Automotive.	- Construction.	- Defense.	- Electronics.
- Food handling.	- Health care.		

VI. Conclusion

Through this work Carbon dioxide (CO_2) is reduced from specified area and thereby reduces the harmful effect of CO_2 on the environment. Also a useful product Sodium Carbonate (Na_2CO_3) is formed which has many industrial and domestic uses. In this method Hydrogen (H_2), and Chlorine (Cl_2) are also formed which have also many industrial and domestic uses.

VII. Future Scope

- Design of NaCl storage chamber should be revised.
- Design of water storage chamber also should be revised.
- Brine solution chamber should be made larger 500ml to enhance the capacity of device.
- H_2 handling and storage should be designed.

- Cl_2 handling storage and transportation should be designed carefully.
- Sea water may be used directly after initial filtration instead of brine solution.
- Depleted brine solution should be brought to the brine solution chamber.
- In the industry where carbon di oxide is produced like (blast furnace) in large quantity same can be used directly without using a reciprocating compressor.

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