INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN: 2278 – 0211 (Online)

Environmental CO_2 Removal Paradigm

Devendra Singh Tomar
ShriRam College of Engineering & Management, Department of Information Technology, India

Abstract:

As we all are familiar about the Carbon-di-Oxide and its harmful effect. This paper is for a design which can be implied on an industrial as well as on a city level to remove the CO2 (mainly), SO2, and other harmful gases from the atmosphere. Here NaOH is used for the removal of CO2.This design consists of all the necessary parts like PVC pipes, fan, pump, tank, etc. Following reactions take place here:

2NaOH + CO2 —> Na2CO3 + H2O

2NaOH + SO2 —> Na2SO3 + H2O

The output will be collected as water having some hardness which can be treated as well and can be used for various purposes.

1.Introduction

Carbon dioxide (chemical formula CO2) is a naturally occurring chemical compound which is a gas at standard temperature and pressure and exists in Earth's atmosphere in this state. It is produced by combustion of coal or hydrocarbons, the fermentation of sugars in beer and winemaking and by respiration of all living organisms. It is exhaled in the breath of humans and land animals. It is emitted from volcanoes, hot springs, geysers and other places where the earth's crust is thin and is freed from carbonate rocks by dissolution.

The environmental effects of carbon dioxide are of significant interest. It is a primary gas responsible for greenhouse effect and it is also a major source of ocean acidification. Its continually increasing concentration in the environment is one of the major burning problems, facing by the governments of the world. Following chart shows the current status of CO2 in the environment and also the concentration of this gas in the last decades [8].

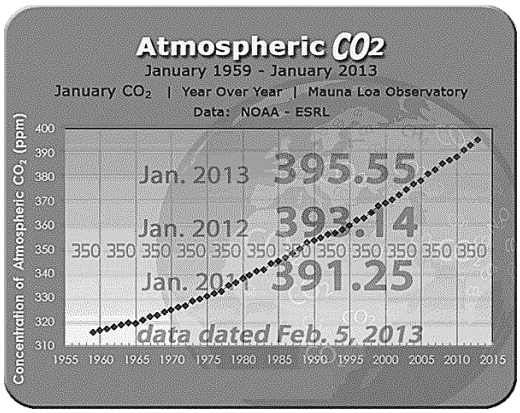

Figure 1: CO_2 concentration graph

In this paper a new design is introduced which is for the removal of the CO2. It is an effort to let residents of the biosphere breathe in a balanced CO2 environment. In this paper, details of this project like, what the project is for, its construction, & working are mentioned. On moving further, reader will found the sections like social impacts, cost of manufacture and maintenance, and some additional information regarding the project work. Thereafter he found the benefits & drawbacks of this project, and the conclusion of this paper.

2.About The Paper

This paper is going to introduce a new design which is for the removal of the environmental CO2. This a simple design whose parts are easily available in the market, and can be fabricated in few hours. It has PVC pipes, a fan, a water pump, and sprayers and the removal of the CO2 is done by using NaOH (Sodium Hydroxide) solution. This chemical not only react with CO2 but also with SO2 to some extent.

2.1.Construction

Here PVC pipes are used which are of diameters 4inches and 0.5 inch, and their respective elbow and T-joints are used. A heavy duty exhaust fan connected in a hopper, a heavy duty water pump are used. Sprayers are used for the sprinkling of the chemical which react with the air. An activated animal charcoal grating is used which deposits air hydrocarbons on it.

2.2.Working

Air intake will occur through the exhaust fan which rises in the vertical pipe. The sprayers connected in the upper part of the vertical pipe sprays chemical on the air which got react with the CO2 and remove it [2]. Rest of the air will deliver in the environmen. The following block diagram shows the construction and working of the above discussion:-

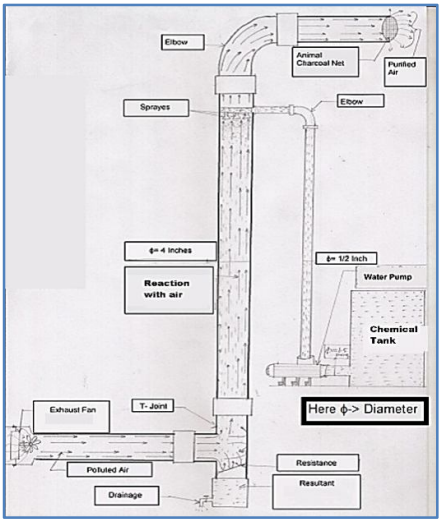

Figure 2: Working Diagram

3.ITs Social Impacts

Social Impact can be defined as the effect of an activity on the social fabric of the community which is for the well-being of the individuals and families. Actually there is not a single definition of this term or concept. But when we talk about 'social impact measurement', then we will talk about understanding the effects on various people that happen as a result of this project. There are three basic steps for a social impact measurement, i.e., strength of the source, number of sources available, and number of targets [10]. After successive and successful experiments, a tabulated result sheet had made which shows that the design is working efficiently and giving excellent results more than the expectations. It is quite promising that the impact by this design, either it may be intended or unintended, direct or indirect, instant or in a long run, would be positive on the society.

4.Manufacture And Maintanence Cost

This design can be made simply by the parts mentioned above which can be found in the market easily. The manufacture cost of this design is nearly equals to 7000 Rs/- and as it has no complex parts so the maintenance cost of this design is also very low as compare to other large, expensive, industrial air purifiers. Moreover this design doesn't require highly professional undertaking.

5.Additional Information

In this section, information regarding operating model of this paper is discussed, and this design is ready and working more efficiently. The innovator of this design is full of energy, ready to drive the opportunities, and it will be his responsibility for the mistakes or errors happen during its operation (if they made).

6.Benefits And Drawbacks Of This Design

6.1.Benefits

- It is very easy to assemble.
- Material used in this project is easily available.
- It is cheaper and simpler than any other industrial air purifier.
- It is very useful on the city and industrial point of view where concentration of CO2 is greater than any other areas.

•This project will increase the employment as well.

6.2.*Drawbacks*

•It is very bulky in size.

•It is very inconvenient for transportation.

•Since chemical is in use here, so extra care should be taken for its handling.

7.Conclusion

In this paper we got information about this design and about a general idea of the CO2, its concentration in the atmosphere, and some of its adverse effects. Out of the severe effects, global warming is the major burning problem, facing by scientists from different parts of the world as well as most of the countries.

Concentration of CO2 is increasing at the rate of 6-9% each year. According to some scientists, if the emission of CO2 is not controlled then because of its increasing concentration there will be a rise of 2 degree celcius in the average temperature of the earth till 2050, which can raise the sea level approximately upto 2 feet.

Moreover, exposure to CO2 can produce a variety of health effects. These may include headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty breathing, sweating, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia, and convulsions. Animals when got exposed to this kind of gas, then they also feel difficulty in breath, tiredness, etc [7].

As only we (humans) can understand the harmful effects of CO2 and also are responsible for this problem. But now it's the time to take some revolutionary steps in order to decrease its concentration. It is the requirement of the time to innovate new designs which can create an environment where the concentration of CO2 is balanced and can make it an innocuous one.

8.Acknowledgement

I would like to thankDr A.K. Saxena (Director SRCEM) for all of his contribution and suggestions during the research work. Also, this research would have not been possiblewithout the guidance of Mr B.M. Saxena (Senior Prof. MechDept). At every step of the design experience he providedvaluable advice thus molding my engineering approach.

9.Refrence

1. Lackner, K.S., "Carbon of Dioxide Capture from Ambient Air", European Physics Journal: Special Topics, p. 93-106, 2009.
2. Fukunaka, Yasuhiro, "Absorption of CO2 Gas into Falling droplets of aqueous NaOH solution". Metallurgical Review of MMIJ, p. 33-50, 1992.
3. Gregory V. lowry, JoshuahStolaroff, "CO2 extraction from Ambient Air using Alkali-Metal Hydroxide Solutions", Carnegic Mellon University, 2004
4. Figueroa, J.D., T. Fout, "Advances in CO2 Capture Technology-U.S. Department of energy's Carbon Sequestration Program". International Journal of Greenhouse Gas Control, p.9-20, 2008.
5. Joshuah K. Stolaroff, David W. Keith, & Gregory V. Lowry," Carbon Di Oxide Capture from Atmospheric Air using Sodium Hydroxide Spray", Carnegie Mellon University, Pittsburg, Pennsylvania, 2008.
6. Spector, N. A.; Dodge, B.F., "Removal of Carbon Di Oxide from Atmospheric Air", Transactions of the American Institute of Chemical Engineers, American Institute of of Chemical Engineers, New York, Vol.42, p. 827-848, 1946.
7. Willie Soon, Arthur B. Robinson, "Environmental Effects of Increased Atmospheric Carbon Dioxide", Vol.13:149-164, 1999.
8. http://co2now.org/
9. http://www.esrl.noaa.gov/gmd/webdata/ccgg/trends/co2_data_mlo.png
10. http://www.illuminateict.org.uk/sites/www.illuminateict.org.uk/files/a_guide_to_measuring_social_impact_v2.pdf