The Potential Risk of Carbon Dioxide Gas in Closed Areas in Faculty Places - Study Case

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Introduction

Carbon dioxide gas is the main greenhouse which is coming from different sources like combustion of organic matter, fossil fuel and deforestation, ocean release etc. In addition, human being exhales CO_2 during his respiration and the average human exhales about 2.3pounds of carbon dioxide on an average day [1]. The study was conducted in public faculty place where many students who used to come to the college in order to have their lessons in different majors. Therefore, there are sitting in different classrooms, library and canteen or roaming and walking between corridors. Three parameters were measured, and they are temperature and humidity and Concentration of Carbon dioxide in both units as % & ppm. The target of study was to correlate between concentration of CO_2 and the presence of students at different locations with various times. Thus, the classrooms and crowed areas with human being started to become hotter and hotter with passing time and especially with less ventilation sources such as exhaust fans or fresh air exchanger system because of releasing of CO_2 in second. As it is noticed the windows will be closed in order to make the rooms cooler and cooler but that will condense gases and settle down on the student' bodies. The below picture shows the reality of situation of students in their classrooms with less ventilation and closed windows during class session and it is same everywhere in the world (Picture 1).
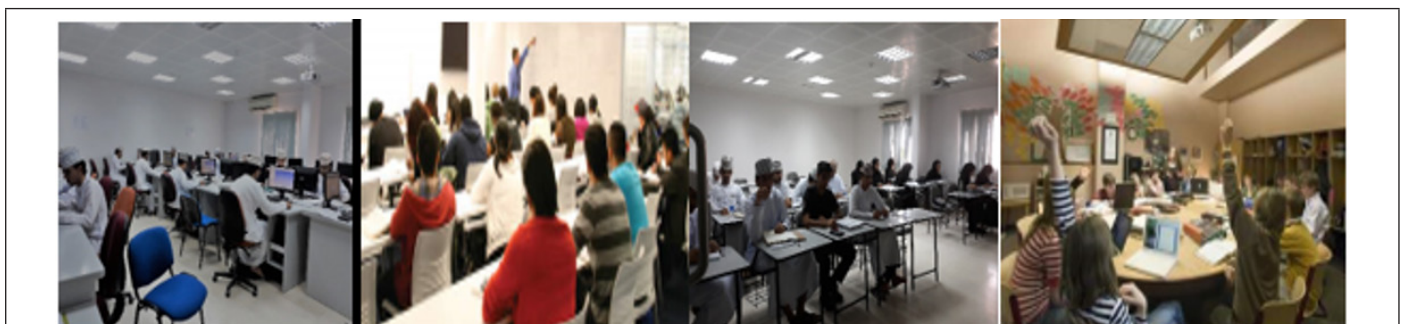
Picture 1: The Situation of students in their classes session with less ventilation system.

It is obvious how availability of accumulated carbon dioxide gas in upper layers of atmosphere could affect the climate and make different environmental issues, but it is necessary to explore to its potential effects on closed areas like vehicles, offices, classrooms, halls, and libraries because most of these places have less ventilation systems. Definitely, it is noticed that there are some side effects on human being' body especially if they are staying for long time in same place without air exchanger system. First, some of sickness like Feeling lazy, headache, Difficulty breathing, coughing, Lack of concentration and all these symptoms can start to appear because of declination in Oxygen level and increment of CO_2 in those areas. Many students and workers cannot spend more than two hours in their classes or offices without having movement. Also many demised cases had been reported in cars due to heart attack or Choking and pain in feet especially at the night during sleeping in bedroom or even though in cars or buses with travelling for long distances which will take around nine hours and more than that like travelling in airplane. It is right there are safe levels of CO_2

concentration in rooms which could let people to feel comfort, but they are not enough aware about precautions which need to be taken in case high level of gas reaches.

The Table 1 shows safe levels of CO_2 in rooms, so it is recommended to install Monitor device in order to observe CO_2 concentration in closed places Which may have a poor ventilation system (Table 1).

Table 1: The Safe level of CO_2 concentration (ppm) in rooms.[2]	
Concentration CO_2 (ppm)	**Potential effects**
250-350 ppm	Normal background concentration in outdoor ambient air
350-1,000 ppm	Concentrations typical of occupied indoor spaces with good air exchange
1,000-2,000 ppm	Complaints of drowsiness and poor air.
2,000-5,000 ppm	Headaches, sleepiness and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
5,000 ppm	Workplace exposure limit (as 8-hour TWA) in most jurisdictions.
>40,000 ppm	Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma, even death.

There are some studies which had reported that, the indoor concentration of Carbon dioxide in classroom needs to be below 700ppm. From point of view, it is devisable because as normal outdoor concentration with 400ppm, so it supposes to be closer or little more. Because people absorb the gas by different other ways, injection though skin or mouth.

Collection of Data

Two devices were used to measure the concentration of CO_2 at different locations over the college. The names of devices are Gas detector (PGas-21-CO_2) and Globe instrument (P Gas-41). The readings were recorded at different times in different places in campus for short period.

Table 2: The concentration of CO_2 ppm at different locations.

S.N	CO2 ppm	Temperature C°	Humidity	Time	Location
1	779	31	30	1:46pm	IT202
2	774	23	35	1:10pm	ME 103
3	774	25	33	1:25pm	BS109
4	773	25	33	4:00pm	ME 216
5	773	31	32	1:46pm	ELC
6	772	21	25	10:39am	ME215
7	772	21	35	1:03pm	ME215
8	772	23	34	1:09pm	ME211
9	772	24	34	1:15pm	elevator
10	772	24	34	1:27pm	BS Passage
11	770	30	32	1:00pm	ME PARKING
12	769	35	NR	2:56pm	ME215
13	769	25	33	11:55am	ME209
14	769	26	33	12:50pm	ME107
15	769	33	33	2:00pm	ME216
16	769	28	34	1:21pm	BS111
17	769	28	32	1:41pm	Eel206
18	769	27	33	2:00pm	EL204
19	767	23	30	3:00pm	ME 215
20	767	31	31	1:55pm	SAC
21	767	27	33	11:30am	ME215
22	767	25	34	1:43pm	IT201
23	765	27	33	1:53pm	IT208
24	764	23	NR	9:09pm	ME214
25	764	25	33	12:40am	ME209
26	764	26	33	1:58pm	IT303
27	763	24	34	10:51am	ME115
28	762	25	NR	10:48am	ME115
29	762	24	33	2:00pm	ME216
30	762	22	35	1:40pm	IT 203

In order to see the variation in concentration of CO_2 so Table 2 shows the concentration of CO_2 gas was in range between 762-779 ppm and most readings were in afternoon time.

Factors need to be considered in order to get more realistic facts about the concentration of carbon dioxide. Constant installation for devices for longer time and it needs to be connected to software system for immediately analysis. Also, it supposes not to be random but specified location needed to study as wise as possible [2].

Many trials need to be conducted in order to confess the reasons behind increment of CO_2 in some places but definitely the main reason is the presence of many of student in same time at same place that leads to record high concentration for CO_2 gas.

Results

Both graphs showed there was increment in concentration of CO_2 in most place during different afternoon and morning time. The readings were in range as it has been reported in Table 1 so that means there good ventilation system such as presence of windows could help in releasing some of gas particulates (Table 3).

Table 3: The concentration of CO_2 ppm at different locations and times.
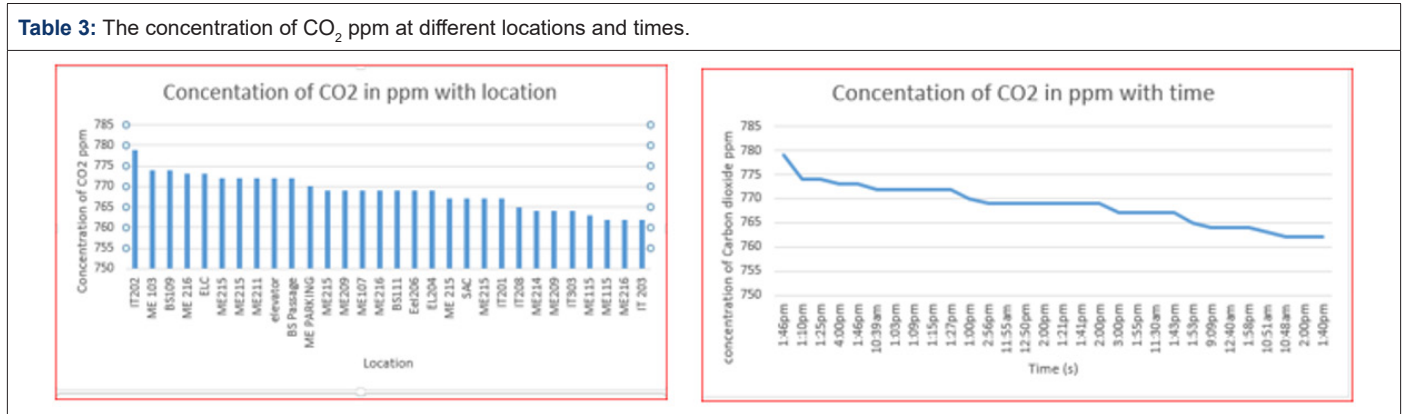
Conclusion

As the number of students is increasing in such place, that will lead to increase the concentration of Carbon dioxide which could affect the atmosphere of the class and make it hotter, then most of students are losing their interest and caution to their classes but it can be managed by good ventilation system which will help to maintain the refreshment in the classroom.

References

1. Rate of CO_2 as exhaling from Human Being.
2. What are safe levels of CO and CO_2 in rooms?