Monitoring of Carbon Dioxide Concentration in Closed Environments

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People in the modern society spend most of their time in closed environments due to present day activities and lifestyles. Hence, the air inside closed environments plays an important role for maintaining healthy mental and physical conditions. The indoor air quality index is defined using the concentration of nitrogen dioxide, carbon monoxide, sulfur dioxide, ozone and particulate matter. But the concentration of carbon dioxide is not classified under that air quality index. However, it has been medically proven that the high concentration of carbon dioxide in closed environments affects the human health. The importance of monitoring of carbon dioxide level in closed environments has not yet been established. There are neither regulations nor standard limits set for the indoor concentration of carbon dioxide in Sri Lanka. The American Society of Heating, Refrigerating and Air-Conditioning Engineers, has set a standard carbon dioxide concentration for indoor environments as 700 ppm. In the present study, we have constructed an electronic device to simultaneously measure the carbon dioxide concentration, ambient temperature and the relative humidity. The research project was carried out to measure the concentration of carbon dioxide inside passenger vehicles, laboratories and hospital rooms with air-conditioning. The increase in carbon dioxide concentration inside those closed environments are mainly due to human respiration metabolism. Although air conditioners control the temperature and the relative humidity, it does not affect the concentration of carbon dioxide. The results show that the carbon dioxide concentration in places under investigation exceeded the limit of 700 ppm. Inside the tested vehicles, the concentration of carbon dioxide increased up to 5000 ppm creating an uncomfortable feeling for passengers. Consequently, the increase of carbon dioxide creates an unhealthy environment. Therefore, it can be concluded that the monitoring and controlling of the carbon dioxide concentration inside closed environments are important for human health.

Key words: Closed environment, Indoor air quality, Carbon dioxide level, Carbon dioxide monitoring