

Impact of Traffic on Carbon Monoxide concentration near Urban Area Road Mid block

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Abstract - Traffic emits a lot of vehicular exhaust that has a number of gases included into it, gases like CO₂ (carbon dioxide), SO₂ (sulphur dioxide), NO₂ (nitrogen dioxide) and CO (Carbon Monoxide) are emitted through the vehicles causing many health related issues and creating air pollution also the emission of these gases causes a acid rain which gradually effects over the environment, all among the gases CO is considered as most deadly because its emission not only causes health related but also causes death due to its toxic free radical mechanism, CO is emitted due to the incomplete combustion of fuel, and mostly this gas comes out as a result of high traffic volume or in the peak hours of traffic when there is a lot of congestion throughout the traffic, due to which CO has increased causing death at a large scale. Traffic generates a maximum proportion of CO from its vehicular exhaust so as to calculate the amount of CO exerted out from the vehicle there is a performance of Traffic volume Survey following by Greenshield's model that inherits the use of relationship between average speed, acceleration and exhaust emission factor.

Keywords: - CARBON MONOXIDE, PEAK HOURS, TRAFFIC DENSITY, ADSORPTION

1. INTRODUCTION

Kanpur is known among the most polluted cities of India and holds 18th rank in the world in pollution index with a index of 90.46, transportation sector alone, release of the economy releases traffic pollutant problems are

particularly acute in a number of major cities amount of fuel used in and increasing in much faster than the actual growth emission of pollutant from the vehicles causes a great affect on health even in some cases it causes illness and death. Most of the CO in the ambient air comes from vehicle exhaust. Internal combustion engines do not burn fuel completely to CO₂ and water; some unburned fuel will always be exhausted, with CO as a component. For rich air/fuel mixtures, CO concentration in the exhaust is high, since the amount of excess fuel (unburned fuel) will be high. Survey it will be obtained to the work in which they have number of vehicles and to working on the roads of the main area of the traffic and they have to be come in the valuation of the that they become to the function and it will be performed of the which is to be total they work and it's to be having with some that they work on it. Vehicles are the major part of the source of air pollution in Kanpur Carbon Monoxide (CO) was the first indicator examined in has given poor results every time there is a test conducted showing more concern about the toxic levels of CO increased in air. Our areas of concern was Ghantaghar which is near the central railway station of Kanpur this area is considered as mostly traffic prone and busy because of the railways the passengers arrive and depart from here to rest of the city due to which a large number of vehicles could be seen here he main crowd of taxi are seen over here which are mostly CNG

fueled but still these vehicles are CO exhausting here CO levels are higher which is 30%. We considered few moderate traffic areas like Kidwai Nagar, Fazalganj, Yashoda Nagar etc., these areas are the area of moderate traffic population index is moderate over here and number of vehicle is almost lower, the ratio of two and three wheeler vehicle are equal lesser exhaust of gases are over this area CO levels are moderate lesser than 10%. There are few low traffic areas that we considered in the survey these areas of concern are Barra, Cant Area and Rooma these areas are mostly covered with greenery and the vehicular density is also lower in these areas, here in the areas of lower traffic the vehicular motion is lesser than the areas of moderate and high traffic also there areas have CO level lesser than 5%. Exhaust emission are more variable in nature and hence more difficult to control. Moreover this survey based project is completed with the help of traffic control board of Kanpur. The pollutants level is foreseen on the basis of traffic survey and traffic count is done manually this traffic survey is done to count the number of vehicles running during the peak hours.

2. Literature Review

i) Pratama (et.all) ^[2019]

In this paper research was carried out in bringing Janggut area, his studies shows that pollutant like CO caused by vehicular exhaust was found to be 51.64% which was quite high enough to cause severe diseases the methodology shows use of Vissim software to carry out various vehicular exhaust values of CO emitted from the exhaust. Through traffic simulation using Vissim software and vehicle exhaust emission calculation using EnViver software, and the results were compared with ambient air measurement results at the research location, as well as providing alternative solutions to existing traffic condition. From direct ambient air measurement at the research location, the existing concentrations of air pollutants resulting from EnViver software output and ambient air measurements on the road network of Beringin Janggut area were still below the ambient air quality standard limits set in Government Regulation on Air Pollution Control. with the lanes separation between

public and private vehicles in improving road network performance and reducing total emission values due to vehicle exhaust emission from existing conditions.

ii) J.E Anderson (et.all) ^[2018]

The paper focuses on criteria pollutants, emission from IC engines, pollutants like NO, NO_x, CO, CO₂ but the major toxicity factor is generated by CO, he proposed vehicle exhaust emission trend and use of zero emission vehicle LDV (light duty vehicle), Ozone depletion due to greenhouse gases is also told and future planning to maintain the air quality so as to maintain the environmental factors like clean air, availability of lesser toxic substances could be reduced by use of vehicles which are efficient as well as compatible with future goals to achieve lesser depletion of Ozone and protect our environment by radiation and air pollution. Over the past 30–40 years, vehicle tailpipe emissions of particulate matter (PM), carbon monoxide (CO), and hydrocarbons (HCs) have decreased significantly. Advanced emission after-treatment technologies have been developed for gasoline and diesel vehicles to meet increasingly stringent regulations, yielding absolute emission reductions from the fleet despite increased vehicle travel. As a result of mobile and stationary source emission controls, air quality has generally improved substantially in cities across the US and Europe. Emission regulation will lead to even lower vehicle emissions and further improvements in air quality. Older vehicle emission and air quality trends, discuss the future outlook for air quality, and note that modern internal combustion engine vehicles typically have lower exhaust emissions than battery electric vehicle upstream emissions. For future vehicle criteria emissions. The answer to this question will have profound implications for automotive and fuel companies and for the future economic and environmental health of urban areas.

iii) Famesh D. Thakre (et.all) ^[2017]

The research paper focuses on experiment conducted by the author and his research team they focused on decreasing the level of CO from exhaust gases of a two wheeler or motorcycle by absorption technology, absorption is carried out in an absorber like device containing a bed of charcoal through which the exhausted gases are passed, charcoal has a property to absorb gases on its surface, it uses an intermediate science concept of surface chemistry, the absorbed gas is mainly

CO and CO₂ these gases are measured and the level of these pollutant are foreseen by doing various approaches. Global warming and global climatic changes resulted from anthropogenic CO₂ emissions has become the main issue recently. Since, the beginning of industrial revolution, the concentration of CO₂ has increased more than 30% in the atmosphere, and resulted in various catastrophic occurrences. Our research is focused on decreasing the level of CO₂ from exhaust gases of a Two-Wheeler or Motorcycle by adsorption technology. The adsorption is carried out in an adsorber like device containing a bed of charcoal through which the exhaust gases are passed. After adsorption he found a significant amount of CO₂ reduction from exhaust gases with an excellent bed's efficiency. The type of CO₂ adsorption is reversible that is physical adsorption is observed.

iv) Jai Prakash (et.all) ^[2017]

This paper shows a study which presents emission factor of gaseous pollutants, from on road tailpipe measurement of 14 passenger cars of different types of fuels and vintage, the fuels that were used for diesel, compressed natural gas (CNG), gasoline their ratios were noted down and the vehicular exhaust was checked and data was noted down which showed that which fuel remains lesser burnt and exhibit more levels of CO. The trolley equipped with stainless steel duct, vane probe velocity meter, fuel gas analyzer, Non dispersive infra red (NDIR) CO₂ analyzer, temperature, and relative humidity (RH) sensors was connected to the vehicle using a towing system. Lower CO and higher NO_x emissions were observed from new diesel cars compared to old cars, which implied that new technological advancement in diesel fueled passenger cars to reduce CO emission is a successful venture, however, the use of turbo charger in diesel cars to achieve high temperature combustion. Based on the measured emission factors, and fuel consumption (kg), the average and 95% confidence interval (CI) bound estimates of CO, CO₂, and NO_x from four wheeler. The present work indicated that the age and the maintenance of vehicle both are important factors in emission assessment therefore, more systematic repetitive measurements covering wide range of vehicles of different age groups, engine capacity, and maintenance level is needed for refining the emission factors with CI.

v) Vibhor sood and shivani sood ^[2010]

The study of this paper indicates CO level and its correlation with traffic volume levels that was due to increase in standards of heavy traffic zones, studies came to a conclusion that the old vehicles should be replaced, infrastructure should be improved, traffic management and establishment of efficient public transport are major actions that could effectively change exhaust CO level and low emission. Chandigarh has witnessed a two fold increase in its population in the recent past. The vehicular population on the city roads is estimated to be around 2 vehicles per person. In the present study an attempt was made to estimate the traffic related CO pollution levels and resulting occupational exposures in Chandigarh, India. The study indicated that the CO levels were positively correlated to the traffic volume and were exceeding the standards in heavy traffic zones. Replacement of old vehicles, improvements in infrastructure, traffic management and establishment of effective and efficient public transport system are among the actions that will need to curtail the increasing trend in air pollution in the city. The map of spatial variation in CO concentration prepared could be used for traffic planning and air pollution control in the city. The CO levels were positively correlated to the traffic volume. Estimated values indicated that the traffic policemen and similar occupants who are having a long term exposure to the elevated levels of CO are liable to have health effects due to the increased CO levels. As the major cause of air pollution in the urban Chandigarh is identified to be the increasing number of private vehicles, measures to reduce this could be one of the major strategies for air pollution control in the city.

vi) Mustasem EL-fadel (et.all) ^[2009]

This paper presented a critical review of worldwide research work conducted to characterize CO exposure inside vehicle, by various methodologies for field testing that includes in vehicle CO exposure, outdoor CO exposure, roadway type, ventilation mode, weather conditions and vehicle characteristics also his research shows how to get rid of excessive CO emission from incompletely combusted fuel. Vehicle-induced emissions constitute a major source of air pollutants, particularly in urban areas, where heavy traffic is common occurrence. Contaminated air can flow into enclosed micro-environments, including vehicle compartments. Among various exhaust emissions, carbon monoxide (CO) was the first indicator examined in passenger compartments. This paper presents a critical review of worldwide research work conducted to

characterize CO exposure inside vehicles. Measurement methodologies for field testing are presented alongside impacts of various factors on in-vehicle CO exposure. Results of in-vehicle CO exposure measurements in various cities are compared. Modeling efforts to characterize in-vehicle CO exposure and relate it to potential explanatory factors are also discussed. Based on the review findings, limitations and future needs are defined.

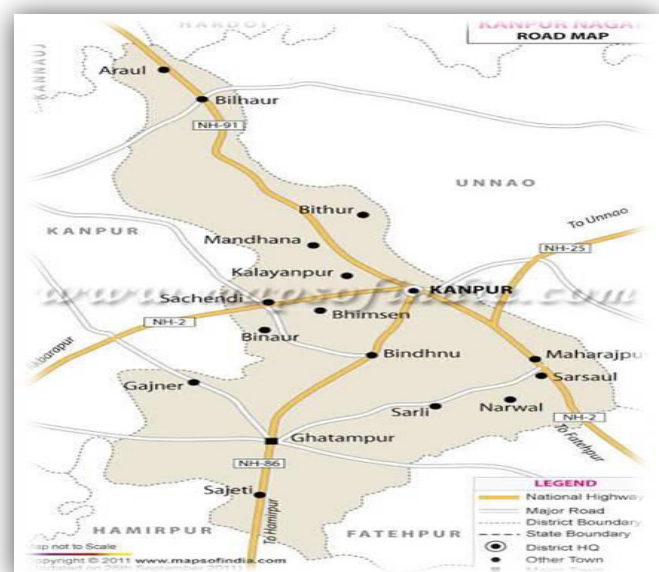
vii) M.Malakootian (et.all)^[2009]

In this review paper an experiment was made Kerman city located in the south eastern part of Iran to check the CO concentration and its impact on environment in the experiment 21 heavy vehicles were observed during middle of each month during a year also the sampling and measurements were taken 3 times daily according 7–12 a.m.; 12–16 and 16–20 pm on the basis of daily periods, 12 samples for durations of 5 minutes were collected and its concentration for 1 hour was calculated on an average and the samples show the impact of CO levels The results obtained indicate that the hourly mean concentrations were lower than WHO guidelines and also lower than measurements of 1989, which has already done. In spite of more cases and higher populations, natural gas distribution was the cause of decline in CO concentrations.

viii) Bukola Olalekar Bolaji (et.all)^[2006]

This paper reviews the vehicular CO emission and its effect on the natural environment, his research shows that CO is emitted due to unburnt fuel, and it easily gets oxidized and forms CO₂ before getting discharged in air also gave methods to control CO emission. Environmental pollution from vehicle sources continues to attract worldwide attention. The danger posed to the natural environment and human health is multi-dimensional and bound to grow in significance following the global upsurge in automobile vehicle ownership and use. This paper reviews the status of vehicle emissions and their effects on natural environment. The implications of emissions such as hydrocarbons, oxides of nitrogen, carbon monoxides, and carbon dioxide among others have been discussed. Various methods of effective control of vehicular emissions have also been presented.

The main objective of this project is to check and monitor the level of carbon monoxide (CO) in Kanpur city urban area mid block in this project we have selected 10 major areas which are categorized as per heavy, moderate and low traffic regions during peak hours In the project we will analyze the traffic density in the areas that is under the traffic consideration during peak hours the main objective is a survey based analysis by counting the number of vehicles in the areas taken and categorized by low, moderate and high traffic regions although the continuous monitoring shows briefly the polluted regions have higher CO levels but for making a suitable account of why the levels of CO concentration are increasing it is necessary to do a detailed survey of the categorized area. Meanwhile selecting each region as a survey based on use of vehicle in the areas also remedial actions that should be taken to reduce the CO pollution. The emission factor is a key parameter in the calculation of vehicle pollutant emission, which is also called emission of unit mass, and it is the average emission under the influence of various factors according to the national standard, namely, Automotive Emission-Terms and Definitions. Vehicle exhaust emission is affected by many



Figures 1: shows a map of Kanpur city.

3. OBJECTIVE

Factors, including the features of vehicles (such as Vehicle type, technical level, emission control devices, and operation condition), urban road conditions, maintenance frequency.

The figure here shows a map of Kanpur city that is our major area of traffic survey, the reason behind selection of this area is to collect data regarding increasing value of carbon monoxide (CO) in the ambient air, because in few decades there has been seen a incremental growth in the concentration of this gas, thus it is a major challenge to monitor this gas as its harmful effects can cause serious damage to organs and cause adverse effect to environment.

4. RESULT AND DISCUSSION

From the above calculation we must be eligible to get a certain results of the traffic flow models and it can become an easier task to maintain the levels of the CO emission to be steady and cannot increase in the area of consideration, traffic being an important aspect releases an ample amount of exhaust which have a mixed number of gases including slow poisonous gases which are released on an account of lesser fuel burning causing greater emission factor and VSP (vehicle specific power) gets affected because of this factor,

Thus the present studies can help in manipulating the amount of carbon monoxide released during the exhaust emission in the traffic and the steady speeds causing greater exhaustive emission.

The expected outcome of the results is:

- ✓ Present scenario of the traffic and vehicular emission and damage causing criteria
- ✓ We can easily get concentration of CO by simply establishing the relationship and following the model
- ✓ This study may help in detecting more gases from vehicular exhaust
- ✓ Quality study may give better results of the testing routes and regulating amount of traffic congestion.
- ✓ Higher amount of CO emission can be regulated by following few rules of designing the roads

5. CONCLUSIONS

The negative impact of urban road traffic is mainly on air quality, ecosystem, and noise level. Due to the continuing increase of motor vehicles, human health and environment have been severely impacted. According to the classification of air pollutant sources in urban area, motor vehicle emission accounts for more than 80% of the air pollution in major cities. The statistics of Kanpur shows that the level of carbon monoxide (CO). Since the concept of sustainable development has been adopted into the theory and methods of urban transport systems planning, the coordination between transportation development and urban environment becomes the focus of the urban transportation research in the 21st century.

For the public security and welfare the data that is obtained from this study can be useful in controlling the traffic the model will eventually give answer to the following questions:

- How to regulate the CO amount?
- What effect could vehicle speed have on exhaust emission?
- Measures that should be taken to reduce CO levels are they valid from studies?

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