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STUDY OF VEHICULAR POLLUTION AND ITS CONTROL

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ABSTRACT :- Vehicles are the fastest growing sector and responsible for two-third of air pollution in urban area. Vehicular pollutants have deleterious effects on human health and ecosystem. Main components of vehicular emissions are carbon monoxide (CO), nitrogen oxides (NO_x), benzene (C_6H_6), aldehydes, 1,3 butadiene (C_4H_6), lead (Pb), particulate matter (PM), hydrocarbon (HC), oxides of sulphur (SO_2) and polycyclic aromatic hydrocarbons (PAHs). But the ratio of these components varies depending on quality of engine, fuels and environment. Steps to be adopted to control vehicle pollution are: purchasing vehicles with advance emission control devices, using cleaner fuels, strengthening the institutions responsible for managing urban air quality, using good fuels, formulation of necessary legislation, and awareness of common people regarding economic and health impacts of the pollution.

KEYWORDS:- Vehicle, emission, fuel, pollution, bio-fuel.

INTRODUCTION :-

Air pollution is one of the serious environmental concerns of urban Asian cities where population is exposed to poor air quality. It occurs when harmful or excessive quantities of substances including gases (such as ammonia, carbon monoxide, sulfur dioxide, nitrous oxides, methane and chlorofluorocarbons), particulates (both organic and inorganic), and biological molecules are introduced into the Earth's atmosphere. According to the World Health Organization (WHO), air pollution is responsible for nearly 7 million deaths per yearin the world. Nine out of ten individuals currently breathe air that exceeds the WHO‘s guideline limits for pollutants.

MAJOR POLLUTANTS OF VEHICULAR EMISSIONS:-

The emissions from vehicles are responsible for the two-third of air pollution in urban area. Vehicles being the fastest growing sector contributes significantly to the global greenhouse gas emissions (Hasan et al. 2019). In India, it is the third most CO_2 emitting sector, and within the transport sector, road transport was found to have contributed more than 90% of the total CO_2 emissions (IEA, 2019).Vehicular pollutants have several deleterious effects on human health as well as the ecosystem. The release of pollutants from vehicles also includes fugitive emissions of fuel and the source and level of these emissions depending upon the vehicle type, age and also its maintenance. The major pollutants released as vehicle/fuel emissions are, carbon monoxide (CO), nitrogen oxides (NO_x), photochemical oxidants, air toxics, namely benzene (C_6H_6), aldehydes, 1,3 butadiene (C_4H_6), lead (Pb), particulate matter (PM), hydrocarbon (HC), oxides of sulphur (SO_2) and polycyclic aromatic hydrocarbons (PAHs). The predominant pollutants in petrol/gasoline driven and diesel based vehicles are hydrocarbons and carbon monoxide and oxides of nitrogen and particulates respectively.

QUALITY OF EMISSIONS:-

Automobile pollution is responsible for causing respiratory distress, asthma, cancers, chronic disease and other serious health effects (Dey *et al.*, 2018a). This pollution is also responsible for acid rain and global warming. For running a vehicle internal combustion engineer esquires mixture of fuels and air. It depends upon the air–fuel ratio. In the lean mixture conditions vehicles produce less CO, less HC and more NOx gases but in the rich mixture conditions vehicles produce more CO, more HC and less NOx gases. Compared to diesel engines, petrol engines produce more CO, HC but fewer amounts of NOx and particulate matter (Jansson, 2000; Keshan *et al.*, 2008). The evaporation from gasoline engine vehicle increases with the increase of temperature and heating of fuel tank, venting of gasoline vapors. Engine modification, fuel pretreatment, fuel additives,

exhaust gas recirculation (EGR) and catalytic converters are the controlling techniques of exhaust gas emissions. Catalytic converters are emissions control devices that convert more toxic exhaust gas pollutants into the less toxic ones. Several types of catalysts are used in the automobile vehicles exhaust gas emissions controls like noble metal, base metal, transition metal catalysts etc. The surface area, pore volume and pore size of catalysts are highly effective on catalyst activity. The catalytic converters are highly active and consistent for reducing the poisonous tail pipe emissions. In cold countries, the emissions from automobile vehicles engines are more. On a cold start condition, the petrol takes up nearly 10 km to warm up and the same for diesel engine may be up to 5 km. In cold start conditions compared to petrol engine vehicle, the diesel engine vehicle produces less unburned fuel as (Dey *et al.*, 2017a). The air: fuel ratio may be as lean as 14.64:1 (by mass). To control the air pollution from automobile vehicle exhaust the Bharat stage emissions standards has set the emissions standards instituted by the Government of India that regulate the formation of certain major automobile exhaust pollutants by vehicles from internal combustion engines (Marsh and Acke,2001).

CONTROL OF VEHICLE POLLUTION:-

Medical cost to treat the affected people causes financial burden to the society. It is expected that more and more people will be living in cities within a few years. This rapid urbanization and economic growth in India has also resulted in increase in the number of motor vehicles. Now it is the high time to find out a solution to reduce the vehicle pollution through vigorous research, survey and mass awareness especially for Indian perspectives. The major concerns are i) types of vehicles commonly used ii) existing road operation for vehicle movements iii) Strengthening the institutions responsible for managing urban air quality and regular monitoring iv) improvement in the fuel quality v) formulation of necessary legislation and enforcement of vehicle emission standards, vi) improved traffic planning and management etc. Besides these, awareness to the common people regarding the possible economic and health impacts of air pollution and eventually their role in adopting the measures for improving air quality, use of cleaner fuels and purchase of vehicles with advance emission control devices are equally important. Therefore, possible solutions to reduce the vehicle pollution are: i)

i) **Drive Less:**
Fossil fuels are exclusively used and the number of vehicles on the roads is increasing day by day. But these vehicular emissions can be reduced by driving less and choosing alternatives such as walking, using the train or public transportation, and even using a cycle.

ii) **Carpooling:** This is another way to drive less, where people from the same neighborhood or same area can share one vehicle instead of each using their own car. Through the reduction of tool tax or vehicle tax, the Government should encourage carpooling.

iii) **Vehicle maintenance:** Car users should ensure that their car is in good condition and does not release harmful substances beyond permissible limit. Cars should be maintained on a regular basis by replacing oil filters, changing the engine oil and greasing the moving parts.

iv) **Using public transports:** Using public transport is a sure short way of contributing to less air pollution as it provides with less gas and energy.

v) **Governmental intervention:** More emissions are produced by vehicles in urban areas because of the heavy traffic and the fact that people have to drive slowly in towns. To address this issue, Government can order that no vehicles enter the central business district and instead, they be parked on the outskirts.

vi) **Invest in zero-emission vehicles:** Electric vehicles have moved away from burning fuel and use electrochemical processes to produce the energy required for a vehicle to move. As the by-product of fuel-cell vehicles is water, so these types of cars are known as zero-emission vehicles. They store energy in an onboard battery and emit nothing from their tailpipe. More research needs to be invested on electric cars.

vii) **Civic education:** Educating common people by both Government and Non- Government organizations (NGOs) can play an important role in awakening the society to the realities of pollution and how reducing it can make the world a better place to live in. This can be

done through the education of students from the school level itself. Civic education, with special reference to the short-term and long-term effects of vehicular pollution on our lives should be brought to the notice of all individuals. It is a task that once imposed can awaken the society to the realities of pollution, its effects and ways to reduce it.

viii) **Progressive policies:** Implementation of legislations that will make people to do the needful for bringing down the levels of vehicle pollution as far as possible. For this, guidelines for standard practices should be framed.

ix) **Discarding old vehicles:** Old vehicles are responsible for more vehicular pollution because their transmission systems are outdated. They may also cause road accidents because of their many complications and replacing them for newer models serves as the most sensible and practical approach. Newer vehicles use new updated technologies and pollutethe environment much less than their older counterparts.

Use of alternative source of fuels: An approach to reduce the automobiles exhausts pollution -

Any materials or substances that can be used as fuels, other than conventional fuels are referred to as alternative or non-conventional or advanced fuels. Bio-fuels are also taken as a renewable source (Bhave and Kulkarni, 2015; Chand, 2018; Dey and Mehta, 2020e). This renewable energy is used to generate electricity; it is often supposed that some form of renewable energy or a part of it is used to create alternative fuels. Research is ongoing into finding more suitable biofuel crops and improving the oil yields of these crops. Bio-diesel, on the other hand, is made from animal fats or vegetable oils, renewable resources that come from plants suchas atrophy, soybean, sunflowers, corn, cottonseed, etc (Mehta *et al.*, 2018a; Ou et al., 2020; Dey and Dhal, 2020d). Fats or oils from these hydrocarbons are filtered and then combined with alcohol like methanol. Thus diesel is formed from this chemical reaction. Methanol andethanol fuel, the primary sources of energy, is the convenient fuels forstoring and transporting energy. As alternative fuels, these alcohols can be used in internal combustion engines (Dey and Mehta, 2020).

CONCLUSION:-

Vehicular pollution is one of the leading causes of air pollution. Every individual should have the responsibility for a cleaner planet. This can be achieved by the combination of cleaner fuels and vehicles that has the potential to reduce emissions by more than 80%.

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