

AUTOMOBILE EXHAUST POLLUTION

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ABSTRACT

With increase of standard of living and growing need for faster communications, the number of automobiles has been increasing and so also pollution from them. The exhausts from them are causing serious threat to public health and quality of life. In addition poor maintenance of roads, adulteration of fuels, improper maintenance of vehicles, heavy vehicular inflow also aggravate this problem. Many harmful gases, particulates like carbon, heavy metals like lead find their way to environment through this pollution. Urban population in all major cities is mainly affected. Rapid increase in lung problems like asthma, cancer etc, at alarming rate represents the intensity of this problem, which needs to be attended on war footing.

Key words: automobile, pollution.

1. INTRODUCTION

The pace of urbanization resulting enormous increase in population and industrial activities has created a huge demand for vehicular traffic. This lead to many sources of pollution like motor vehicles, coal sources for power plants, industrial waste (both solid and gas) leading to development of primary pollutants like particulates, Hydrocarbons, Carbonmonoxide, Sulphur oxides, nitric oxides and secondary pollutants like sulphuric and nitric acids, PAN's etc. Automobile exhausts combine sunlight results in photochemical smog which effects human eyes and causes significant damage to plants. It is estimated that there are 500 million cars for 5.5 billion population and demand is increasing rapidly. Combustion of fossil fuels has become a major threat for environment. The exhausts of these automobiles release over 200 types of hydrocarbons after burning of gasoline. The amount of exhaust depends upon the engine design as combustion takes place at the engine.

2. DISCUSSION

2.1. Factors influencing emissions

1. Air-fuel-ratio: It is the ratio of mass of air supplied to the mass of fuel. It is the most important factor to be controlled to decrease the emission levels. If the engine is operated at lean mix ratio we can reduce carbonmonoxide emissions.
2. Spark timing: In normal gasoline engine ignition spark occurs 15 to 20°C before the piston reaches to dead center. If this is reduced we can decrease the amount of hydrocarbon and nitricoxide emissions.
3. Carburetion: The function of carburetor is to provide the engine with a homogenous mixture of fuel vapor and air at the mix ratio required for satisfactory engine operation under wide range of conditions. Because of number of factors such as manufacturing tolerances, carburetor adjustment, basic carburetor design and physical properties of gasoline it is not possible for carburetor to provide engine with required fuel mixture leading to increase of exhaust emissions.
4. Surface-to-volume ratio: The ratio of surface area to the volume the combustion chamber has an influence upon quenching the combustion reactions.

2.2. Sources of Automobile emissions

1. Exhaust emissions: The common emissions like CO, NO₂, Oxides of sulphur, hydrocarbons, lead oxide (from TEL) and particulate matter come under this category.
2. Evaporative emissions: The two sources of these emissions are fuel tank and carburetor.

2.2.1. Carburetor emission can be from

- a) Running losses occurring during engine operation
- b) Net soak losses occurring when vehicle is parked.

- 2.3. Crankcase emissions: In engine the reciprocation motion of piston is transferred to a rotating crank connected to drive shaft and wheels. Although the pistons are made to fit in the cylinder as tightly as possible, some gases are blown past by them by the force of explosion during the compression power strokes of engine. These gases which are mostly unburnt hydrocarbons get into crank case.

3. CONCLUSION

3.1. POLLUTION CONTROL MEASURES: Various methods are suggested to reduce the pollution from automobile exhaust.

1. Fuel change: When gases fuels are employed in place of gasoline reduction of emission is observed. 98% CO, 87.99% HC, 53-87% NO_x reduction was seen in these emissions. Use of LPG also reduced exhaust emissions. But this method leads to increase power consumption. Some disadvantages of gaseous fuels are their transport, complicated filling procedure and increased danger of accidents. More research has to be done to minimize these problems.
2. Engine modification: The degree of spark retardation must be carefully controlled to reduce exhausts.
3. Stratified charge engine: Here the intake stroke air has to be either pre heated or inducted with swirling motion to obtain constant density. Later on liquid fuel is injected.
4. To reduce HO and CO emissions surface to volume ratio should be decreased. Retarding spark and increase of gas temperature helped in decrease of these emissions.
5. To decrease NO_x emissions flame temperature should be reduced. Exhaust gas recycling also decreases NO_x emissions.

6. All the above methods are applicable to the manufacturer of automobiles. But once vehicle comes out of the factory it is the responsibility of the owner to reduce emissions. Regular servicing, idle driving, use of good quality fuel & unleaded petrol, methods like car pooling etc must be adopted by the owners to reduce pollution.
7. From part of the government smooth and wide roads need to be constructed. To reduce traffic jams staggering of working hours, prohibition of heavy vehicles at peak times should be under taken. Increase of public transport vehicles, use of light cars with small engines, use of bicycles, should be encouraged.
8. Strict measures have to be taken to maintain the prescribed standard levels of emissions like CO, NO_x, hydrocarbons etc.

4. REFERENCES

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