ENVIRONMENTAL IMPACT ASSESSMENT, AUTOMOTIVE FUEL EMISSION, POLLUTION AND HEALTH EFFECT CONTROL

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ABSTRACT

Study has examined automotive emissions and the possible out come of effects to improve air quality by altering the mix of motor vehicle fuels the major air pollutants are lead carbon monoxide volatile organic compound VOC nitrogen oxides NOS sulphur oxides and particulates. These materials are produced by following sources transportation fuel combustion industrial processing solid waste disposals. Lead is the most harmful pollutant and probably the easiest to be eliminated over time. The other pollutants have been reduced but they are more difficult to control because emissions of them tend to increase with growth in population economic and industrial activity. Efforts is made to study the environmental of automotive fuel emission pollution health effect and control measures.

Key words: Automotive fuel emission, motor vehicle, lead.

INTRODUCTION

The motor source of pollution is linked with petroleum product is emission from automobile exhaust which contain carbon monoxide sulphus dioxide and lead. These gases and lead constitute serious pollutant. Oluwande 1979 recorded high levels of these gases in the central Ibadan for CO_2 the recorded level was 10,6 ppm whereas the recommended world health organization limit was 8,6 ppm. In the case of SO_2 the annual mean level was 0,10 ppm and WHO limit was 0,02 ppm. About 98% of the daily observations was 0,07 ppm. Urban cities like Lagos Port Hacourt and Kano should similar levels of gases. In the production of petroleum tetraethyl lead is usually added because its antiknock properties. it has been s revealed that during driving from 60-70% of added lead is emitted through the exhaust pipe to the atmosphere. This is enviably deposited on the road side vegetation. in this way lead may get into the food chain if vegetable and fruits grown on road sides are consumed. Lead is a very poisonous elements which invariably effects the people who ingest it.

MATERIAL AND METHOD

Nature of automotive emissions combustion engineering air pollution from motor vehicle arises from the evaporative emission of the fueling systems of volatile organic compounds VOCS such as hydrocarbons HCS and post combustion chemical compound that leaves the engine through the exhaust tale pipe system and the crank case. In engine using unleaded gasoline the compounds in the exhaust are typically HC, CO and oxides of nitrogen NO in diesel engine includes particulate related to smoke and in engine using alternative fuels such as methanol include VOC compounds as formaldehyde. Hydrocarbon in the exhaust are incompletely burnd or unburt fuel and oil. CO is formed in combustion processes and is also present in small quantities in the exhaust regardless of the air fuel ratio. Oxides of nitrogen are formed during the combustion process increase with peak combustion temperature and are also a function of the air fuel ratio.

Automotive emission control air quality

Automotive pollutants directly and indirectly have adverse health effect and their discharge into the atmosphere has been subject to regulatory control over two decades. Exhaust emission can be limited by a variety of means. Exhaust gases that escape passed deposition rings into the crank case are drawn back into the engine using a positive crank case ventilation system and the unburnt HCs are combusted. Emissions release through the exhaust pipe are controlled eventually all vehicles today by three ways catalytic converters in the exhaust system and by electronic control in gasoline powered engine. The introduction in 1975 of the three way catalyst marked a major stride emission technology because it enabled the limitations of NOS, HC and CO emission to levels in compliance with current air policy standard.

Control of hydrocarbons public health hazards

Hydrocarbon emission from the fuel system that occur while the car is in operation parked are controlled by using a carbon canister that absorbs the vapour. Hydrocarbon losses during the fueling when vapour is displaced from the tank by the entering liquid can be controlled either by reforming vapour for the vehicle to the service station or by using a larger carbon canister on the vehicles that traps the fuel vapours. Carbon dioxide CO_2 a green house gas is a common house product of any engine that burns carbon based fuel but it potential effects on global planet is a cause for increasing international concern. recent studies have expressed the issue of possible global worming from projected in the concentration of the green house gases CO_2 methane nitrous oxide (N_2O) and chlorofluorocarbon (CFCs) in the atmosphere. These are use in the working fluid in automotive air auditing systems. These are potent green house gases and would be eliminated. carbon monoxide displaces oxygen from hemoglobin in blood stream is considered conservative of health problems photochemical oxidants smog ground level ozone are formed in the atmosphere in the photochemical reaction of VOC and NOS

emitted from tail pipes of the vehicles. Oxides of nitrogen are considered hazardous and ozone is debilitating irritant especially of the respiratory system. Animal toxicologic and human epidemiologic studies suggest that ozone plays a role in the initiation of respiratory disease posses. In addition short term health effect are associated with ozone exposure including in payment of long function. many health studies indicated that life time exposure of high levels of ozone may result in premature ageing of the lungs but no reliable estimates of the effects of the expectancy is available. In this system platinum and rhodium are used in the front part of the converter to reduce NOS and palladium and platinum are used in the rear part to oxidize HC, CO and NOS. The effect of N_2O are decent from the effect of NOS which by common usage refers nitric oxide NO and nitrogen dioxide NO_2. Nitrous oxide is a green house gas NOS is active in the photochemical reaction that produces ozone.

CLEAN AIR ACT QUALITY STANDARD VEHICLES AND INDUSTRIES

Vehicles remain a significance source of pollution in most major urban areas in Nigeria. Today the ambient standard fro CO emission is been exceeded in may urban areas. Public awareness is created to improve air quality. Attempts are made for the ambient air quality level and the ozone non-attainment problems through more stringent control on automotive emission requirement for automotive cleaning fuel controls on industrial facilities and other measures. The clean air act amendment be adopted by states that are in compliance with ambient air quality standard.

Technology development

An attractive technology for improving fuel economy involves the introduction of excess air or exhaust gas recycling during combustion in the learn-burn approach. For NOx control under lean-burn condition using excess air, substantial effect are under way to develop NO_X control technologies for lean-burn systems gasoline or diesel. Researchers are exploring new catalytic composition in zeolites containing copper and other elements.

The cities standard of 0,2 ppm of NO_X may not be feasible for the current mix of automobiles and light trucks and it is likely to be most difficult to meet the largest vehicles. in addition this standards are likely for close broad application of promising current and emerging technologies for improving fuel economy such as lean-burn engines particularly for larger vehicles. Some are adopted for seriously by some states. In view of the difficulty of meeting this NO_X standard other approaches such as increasing controls of NO_X from stationary sources should be considered. It appears possible that a lean NO_X catalytic system technology achieving a 50% reduction in NO_X with the durability could be developed. Lighter weight vehicle have the potentials for lower NO_X emission and higher fuel economy and thus offer health advantages in improved air quality and lower CO_2 emissions as a result trends towards lower emissions level and higher fuel economy will favour lighter vehicles.

Emissions of HC, CO and NOS from existing vehicles probably can be significantly reduced by lowering the sulphur content of gasoline. In addition lowering the sulphur content would reduced the light-off temperature and increase the feasibility to use other catalytic metals in new vehicles.

Surveillance of sexisting vehicles

Surveillance and enforcement of emission standard in the existing fleet may be an attractive to increasingly stringent controls on new vehicles. Field indicated that reductions future emission would be achieved mainly by a system approach involving coordinated action in the following area fuel change in composition combustion systems balance of emissions and efficiency to take advantage of the composition of new fuels. Emission controls improvement in effectiveness and life of catalyst improvement in refueling connection to reduce emission vehicles design improvement in vehicle efficiency and mileage.

DESIGN TECHNOLOGIES ALTERNATIVE AUTOMOTIVE FUELS

Unlike most air pollutant ozone is not emitted as a combustion product rather it is formed in the atmosphere by reactions of precursory of pollutant. The chemistry of ozone formation involves several steps. Air combustion processes produced NOX as shown in equation 1 and equation 2. Nitrogen dioxide reaction subsequently produced ozone equation 3 and 4 therefore limiting ozone requires reducing emissions of NOX. However ozone is very reactive with nitric oxide NO as shown in equation 5 producing oxygen O2. The scientist believe that NO will react with hydrocarbon preferably to ozone. This means that atmospheric concentration of hydrocarbon need to be limited to reduce ozone concentration. Catalytic converter systems can be designed to react with CO and NO in exhaust gases to minimize emission of NO in accordance with equation 7.

N2 + O2 – 2 No	equation 1
2NO + 02 – 2 No	equation 2
NO2 + ultravioletion – NO + O Nascent oxygen	equation 3
0 + 02 – 03 (Ozone) –	equation 4
NO + O3 – no2 + 02	equation 5
2CO + 2 NO – N2 + 2 CO2	equation 6

The emissions of NOX come predominantly from high temperature sources such as electricity generation boilers and industrial furnaces. The hydrocarbon emissions are

mainly a result of processes such as gasoline evaporation incomplete gasoline combustion and solvent evaporation.

CONCLUSION

A recent report by conservation by Clean Air and Water of Europe concave insisted that the onboard vehicle canister root to limiting VOC, evaporative emission would be more effective and less costly than limiting the vapour pressure of gasoline at the pump. it is estimated that most CO emissions come from automobiles despite considerable reductions achieved by catalytic converters. Catalytic converters react oxygen from air with CO and unburnd hydrocarbon to form CO_2.

Another approach to reduce CO is to blend oxygenate into gasoline. These alcohols and ethers both enhance on leaded gasoline octains and reduce CO emissions. in the US the 1990 clean air act amendment CAAA mandated the use of gasoline containing 2,7% wet oxygen n certain areas for the winter months beginning in November 1992. Regulatory pressures ahs also limited the concentration of Benzene in gasoline. Benzene is considered hazardous to personnel handling of gasoline breathing of vapours.

The SO_2 emissions from diesel fuel are controlled by limiting sulphur content. The diesel aromatics particulates precursors concentration would be controlled by limiting the cetane index to a minimum of 40. The diesel particulate emission are controlled by using traps on vehicles exhaust gas.

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