Vehicle Pollution: which is worse. Diesel or Petrol?

The article which appeared under the heading of "Pollution from motor vehicle fuel" in the "Features" column of the London newspaper on 21st January 1991 written by D.E. Akonole has greatly opened the public on how pollution from vehicles. The writer seems to have definitely written important aspects of how pollution from diesel engines and as a result, the main problem with the diesel engines has been the emission of carbon based particulate matter which is virtually non-existent in petrol engines.

Contrary to what has been stated in the past few years, the emission levels for both petrol and diesel engines have fallen drastically due to improved technology and fuel quality. However, in a recent study by the German Federal Environmental Agency (UBA), it was found that of the two types of engines, diesel engines emit the highest amount of cancer-causing particle matter. In fact, the study put the figure at 100 times the amount generated by petrol engines.

The other main problem with diesel engines which compared with petrol engines is the increased emission of NOx. It is this increase in NOx that is the main reason for modern emission regulations; thereby making the need for cleaner technologies for diesel engines imperative. Particulate matter, on the other hand, is already subject to the most stringent emission regulations.

The following passage gives a synopsis of the various diesel pollutants along with the information on health and environmental effects (not tackled in Dr. Akonole's article).

Particulate Matter

Diesel Particulate Matter is the most recognised and most obvious problem due to the black plumes of black smoke, which appear from the tailpipe.

Particulate Matter from Diesel engines is a complex mix of solid and liquid matter and the main constituent is soot. This soot is generated in the cylinder as a result of incomplete combustion. Under heavy load conditions, when not enough oxygen is supplied, the hydrocarbons in the fuel (HC) and carbon dioxide (CO2) produce soot in the absence of sufficient oxygen. These particulates have been shown to absorb and condense onto their surfaces, including many known or suspected carcinogens and mutagens.

It has been widely accepted that particulate matter (PM) from diesel engines is a significant source of cancerous and toxic emissions. According to tests carried out under laboratory conditions, air pollution from diesel vehicles contributes to a long list of respiratory problems, especially among children. Therefore, the health effects of diesel exhaust emissions are considered to be among the most serious air pollution problems.

Particulate Matter emitted by diesel engines is not the only thing that poses a threat. Manufacturers also use other compounds such as dry carbon, naphthalene, organic matter and sulphuric acid particles.

The particles tend to fall into three different subcategories: ultrafine particles less than 0.5 microns in diameter, fine particles between 0.5 and 2.5 microns, and larger particles larger than 2.5 microns.

Health Effects of Diesel Particulate Matter

According to the Diesel Particulate Matter Institute of the United States, the particles in diesel emissions are very small (50% are less than 0.1 microns) and have a large surface area to volume ratio, making a large percentage of the surface area available for chemical reactions. These particles have been shown to be harmful to human health, including the respiratory system, heart, and immune system.

Environmental Effects of Diesel Particulate Matter

On a mass basis, vehicles are estimated to produce around 5% of airborne particulate matter in the UK. Once airborne, diesel particulate matter is capable of traveling long distances and remains suspended in the atmosphere for long durations. The small size of airborne particulates makes them particularly harmful to human health. Exposure to diesel exhaust can lead to various health issues such as respiratory problems, cardiovascular disease, and even cancer.

Nitrogen Oxides (NOx)

Nitrogen oxides are a significant source of air pollution from diesel engines. Nitrogen oxides (NOx) are formed when nitrogen and oxygen (under high combustion rates) react together due to the high temperature and pressure in the combustion chamber. NOx formation occurs during combustion, particularly near the point where fuel is not burned and at high temperatures and pressures in the combustion chamber.

Nitrogen oxide emissions are a significant concern for diesel engines, particularly in the transportation sector. Nitrogen oxides can cause respiratory problems, cardiovascular disease, and even cancer. The main sources of nitrogen oxide emissions are the burning of fossil fuels in diesel engines and the exhaust systems of vehicles.

In conclusion, in Sri Lanka the consumption of diesel fuel in many ways that affects not only the large transportation sector but also the environment. The presence of nitrogen oxides in the atmosphere can lead to various health issues such as respiratory problems, cardiovascular disease, and even cancer. Therefore, it is important to reduce the consumption of diesel fuel to improve the environment and public health.

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