

An Experiment to Control Pollution Caused By Exhaust Gases of Automobiles

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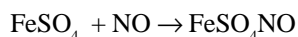
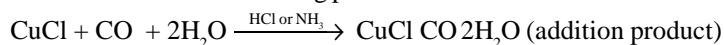
ABSTRACT

Exhaust gases from auto vehicles are the main source of air pollution, especially in urban areas. These exhaust gases consist of oxides of nitrogen and carbon monoxide causing pollution of air and producing the disturbance to the dynamic equilibrium of nature. These gases are toxic to humans, animals and plants. To get rid of this problem the paper proposes a new device to check the entry of NO₂, NO and carbon monoxide into the atmosphere by connecting a specially designed fibre glass absorption chamber to the silencer of the auto vehicles. The chamber is divided into three parts and filled with such chemical which absorbs oxides of nitrogen, CO and carbon particles. This experiment is successful to check the CO and NO₂ pollution up to an extent.

The problem of air pollution is increasing day by day and causing great threat to dynamic equilibrium of the atmosphere (Kaith 1976). Carbon monoxide, SO₂, H₂S and NO_x are continuously being released into the atmosphere through different sources like industrial and automobiles, volcanic activity, etc. The 90% global air pollution is mainly due to carbon monoxide, nitrogen oxides (NO_x), hydrocarbons and sulphur dioxide (Murray et al. 1975).

The gases coming out from automobiles are mainly carbon monoxide and oxides of nitrogen, which are toxic to humans. If we could control the entry of these pollutants in to the atmosphere, we would be able to solve more than 90% problem of air pollution. The study describes an experimental effort to check the entry of these gases into the atmosphere.

The study proposes a device to check CO and NO_x pollution from the exhaust gases of automobiles by connecting a specially designed fibre glass chamber to the silencer. This chamber is divided into three parts. The first part is filled with water, second part contains acidic or alkaline cuprous chloride solution and third part is filled with ferrous sulphate solution. When this specially designed chamber is attached to the silencer of running vehicle, the heavy particles of carbon, etc. are settled down in the first part of the chamber which contains water. After that exhaust gases enter the second part of the chamber having acidic or alkaline cuprous chloride solution, where carbon monoxide gas reacts with cuprous chloride and forms a compound like CuCl.CO.2H₂O. Thus, CO is absorbed in this part. Now CO and heavy particle free gases enter the third part which contains ferrous sulphate solution, which absorbs NO_x. Thus by this device, CO and NO_x pollution can be controlled up to a great extent. The reactions taking place in the chamber are as under.

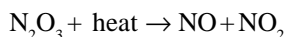
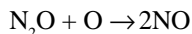


When fuel like diesel, petrol is burnt in the presence of insufficient amount of oxygen, carbon monoxide is formed due to incomplete combustion of carbon ($2\text{C} + \text{O}_2 \rightarrow 2\text{CO}$). Secondly, in indus-

trial process exhausted CO_2 when reacts with carbon, carbon monoxide gas is formed ($\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$). At high temperature the CO_2 may be converted into CO ($2\text{CO}_2 \rightarrow 2\text{CO} + \text{O}$).

Out of total amount of carbon monoxide in the atmosphere, about 64% carbon monoxide comes from transportation, about 9.6% carbon comes from industrial process like steel and iron industries and 17% carbon monoxide comes from miscellaneous sources like forest fires, agricultural burning, etc. (Buch 1972, Williamson 1973). Carbon monoxide reacts with haemoglobin of blood to form carboxy haemoglobin (Lee 1977), which decreases the oxygen carrying capacity of blood, causing human beings to feel problem in normal breathing, loss in awareness and judgment, and causing death at high level of CO.

Nitrogen dioxide and nitric oxide cause atmospheric pollution. The man-made source of nitric oxide is combustion of coal, oil, natural gases and gasoline. It is formed in many combustion processes involving air. In this reaction N_2 reacts with O_2 at high temperature forming NO and NO_2 ($\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$; $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$). Other oxides of Nitrogen are also found in the polluted air, which are converted into NO up to some extent through various reactions.



The concentration of NO and NO_2 is increased in the atmosphere during heavy traffic. Like CO, nitric oxide also forms bond with haemoglobin and affect its oxygen carrying capacity. Thus, when a person inhales the NO in large concentration, it makes problems in normal breathing. NO_2 is found more toxic than NO.

This devise may be proved fruitful for checking the entry of harmful automobile gases into atmosphere. The idea of connecting a three partitioned chamber containing different chemical solutions to the silencer of the vehicle may show a new pathway to transport authorities, pollution control bodies at government and non government level, and automobile manufacturing companies in order to design new automobile vehicles. This experiment will certainly prove a milestone in the direction of minimizing the air pollution particularly in the urban areas.

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