

CHEMISTRY

One Smog Theory Upset

➤ "LAUGHING GAS" formed in the upper atmosphere was cleared of any responsibility for production of earth-bound smog at the American Chemical Society meeting in New York.

In reporting that upper atmosphere nitrogen compounds are not related to smog formation, as some theories have suggested, an Air Force scientist gave ammunition to a growing body of scientists who place the blame for the increasing smog and air pollution threat on automobiles. Other chemists promptly elaborated with detailed evidence against auto exhaust fumes.

Dr. Lewis E. Miller, Air Force Cambridge Research Center, Bedford, Mass., ruled out the possibility that nitrogen compounds always associated with smog might be formed at high altitudes by natural reactions. Although nitrous oxide, sometimes called "laughing gas," is found at very high altitudes, it is prevented by an atmospheric layer from reaching earth where it could engage in the formation of smog.

Sunlight, it is thought, acts on nitrous oxide to produce nitric oxide and nitrogen dioxide, major smog ingredients. When this upper atmosphere nitrous oxide passes through the lower ozone layer girdling the earth, the laughing gas is broken down into harmless components not associated with smog, Dr. Miller believes.

The Air Force scientist emphasized that, so far as his report is concerned, the work does not rule out the possibility that nitrogen oxides are formed lower in the atmosphere, below the ozone layer. He told SCIENCE SERVICE that, before the relationship between nitrogen oxides and smog formation can be thoroughly understood, "information of the chemistry of these oxides at all levels of the atmosphere is needed."

Most air pollution theories name automobiles as the major culprits and hold that smog-forming nitrogen oxides pour into the atmosphere from car exhausts. The evidence amassed against automobiles in recent years was strengthened by these reports before the ACS symposium on air pollution:

1. The amounts of nitrogen oxides released through exhausts depend on the immediate operating condition of the engine, G. J. Nebel and M. W. Jackson, General Motors Corporation research staff, Detroit, reported. The influencing factors are air-fuel ratio, spark timing, manifold pressure, engine speed and compression ratio, with greatest amounts of nitrogen oxides formed by "lean" fuel mixtures containing too much air. (See p. 200.)

2. The variables reported by the General Motors scientists were confirmed by D. A. Hirschler and R. C. Getoor, Ethyl Corporation Research Laboratories, Detroit, who verified their laboratory work by road tests with passenger cars.

3. Smog ingredient measurements made in Los Angeles by Air Pollution Foundation scientist Dr. Lewis H. Rogers showed a direct correlation between smog and the presence of automobiles. He said recent

measurements made near a heavily-traveled freeway showed higher concentrations of nitrogen oxides than reported by an earlier test made away from traffic.

4. Earlier reports indicating smog formation does not depend on the type of gasoline burned were denied by Dr. Paul P. Mader, Joseph Gliksman, Marcel Eye and Dr. Leslie A. Chambers, also of the Air Pollution Foundation. Gasolines of a type produced before 1940 have less smog-producing ability than do the fuels marketed since 1942. However, they pointed out, new types of gasoline, finding increased use the past two years blended with other gasolines, contain fewer smog-producing ingredients.

Irritants in Smog

➤ SCIENTISTS will be able to dig deeper into the smog problem with a technique reported that will permit the identification and isolation of air pollution components in sizable quantities.

Urban atmospheres contain hundreds of different compounds. So far about 100 organic compounds have been extracted in pure form, of which only a few have been positively identified. The main technique used so far, chromatography, yields smog compounds only in minute quantities.

The larger quantities should permit identification of the separate components in air samples. Scientists might also be able to determine which compounds are capable of causing cancer and which, if any, of the cancer-producers are present in large enough amounts in the air to start cancers.

The new method is called fractional sublimation. Smog samples are placed in a tube, heated and vaporized. When they resolidify they do so in pure crystalline bands at different points along the tube. The tube is cut into sections, each containing different components.

The research of Jerome F. Thomas, Bernard D. Tebbens, Mitsugi Mukai and Eldon N. Sanborn of the University of California's School of Public Health was reported to the Chemical Society meeting.

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SURGERY

Foot Drop Cases Aided By Muscle Transplants

➤ CASES of foot drop, where the muscle that normally lifts the forward part of the foot is paralyzed, can be corrected surgically by transplanting half of a muscle that controls the flexing of the heel.

This was reported by Dr. Gene D. Caldwell of Louisiana State University to the International College of Surgeons meeting in Chicago.

Persons with foot drop have what is known as "steppage gait." Since there is no muscle to hold the foot up, it hangs limply when lifted and either causes an

awkward drag in walking or forces the person to step high.

The new operation requires splitting the gastrosoleus muscle, which serves the ankle, and transplanting half of it to provide the power needed to lift the foot. It has been done in 13 patients and when the correct half of the muscle was used, the operation gave satisfactory results.

All of the patients showed a markedly improved gait, Dr. Caldwell said.

Although the number of cases is small and the follow-up time probably too short to draw any positive conclusions, the new technique has proved the most satisfactory to date, he added.

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