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May Have Found Way To Limit Auto Pollution

A Michigan State University soil scientist and a chemist may have discovered a cheap method of removing some dangerous exhaust pollutants.

One of the troublesome emissions from the internal combustion engine is nitric oxide. Oxides of nitrogen are formed when nitrogen in the air-gas mixture in the cylinders is exposed to the electric spark. Basically the same process is used in industry when making nitric acid by the "arc process."

When nitric oxide escapes into the air, sunlight causes it to combine with other auto exhaust pollutants—called hydrocarbons—to form some of the smog which shrouds our big cities today.

Dr. Max M. Mortland, professor of soil science, and Dr. Thomas J. Pinnavaia, assistant professor of chemistry, have found that a common clay impregnated with cobalt will absorb large quantities of nitric oxide.

"It costs about \$6 a ton," says Dr. Pinnavaia.

In 1965, Dr. Mortland published a paper in a soil science journal about the facility of clay impregnated with metals to absorb oxides of nitrogen. He was interested in how clay soils reacted with nitrogen compounds and how this would affect agriculture.

Dr. Mortland explained that it is the physical structure of the clay which allows this absorption to take place. The clay is made up of a lattice-work of silicate sheets giving it a large internal surface area.

"One pound of clay has about 100

acres of surface area," says Dr. Mortland.

The nitric oxide does not react with the clay but with a metal which is present inside the silicate lattice-work. Thus the clay is just a very efficient vessel for the reaction to take place in.

"After I published that paper," says Mortland, "it was greeted with a deafening silence."

But Dr. Pinnavaia became intrigued with using the process to purify automobile exhausts and suggested this to Dr. Mortland. The two scientists then jointly studied the process until they found that clay impregnated with cobalt seemed to work best.

"One pound of cobalt-saturated montmorillonite clay will absorb about five liters of nitric oxide," says Dr. Pinnavaia.

Automobiles presently discharge between 1,000 and 3,000 parts per million nitric oxide. The use of non-leaded gasoline should bring this amount down to about 700 parts per million. The two MSU scientists feel that they may be able to eliminate the rest.

The two emphasized that they have not actually built a workable filter.

"We haven't stuck it in an exhaust pipe yet," says Pinnavaia. "All we're suggesting is a principle that should work."

The two still feel there could be improvements to the idea.

"Ideally we'd like to break the nitric oxide back down to nitrogen and oxygen," they said.

So they're working on that now.