This well-known and widely used technique, developed by Dr. Frederick G. Cottrell of Washington, D. C., uses a powerful electrostatic field to attract the particles in the smoke which it is desired to remove. But its sizable cost of installation (getting proper electrical insulation and protection runs into money) has limited the number of Cottrell units throughout the world to hundreds only. For an effective reduction of the smoke nuisance thousands of installations would be required in the small industrial plants which now feel they cannot afford the costlier equipment.

Not for Fog

The answer to the question on the relative merits of the Cottrell and St. Clair methods is that one has to know something about the cheapness of a real installation and not merely a laboratory demonstration model. It seems as if the St. Clair method might be cheaper but no one yet really knows.

At the recent demonstration of St. Clair's device in Washington, Dr. Cottrell was asked what the possibility might be of using the system of sound waves to clear fog from an airport and the idea that enemy smoke screens in time of war might effectively be dispelled by the method. He smiled and shook his head. No.

The system, he indicated, relies on the use of standing waves to bring about the clearing phenomenon. It works nicely inside a tube or chimney but to try it on an airport would be most difficult in that the sound waves would spread in all directions, including upward, and so much of their energy would be lost. As for using the device in wartime, Dr. Cottrell merely pointed out that if the enemy would let you set up a large reflecting surface behind their lines you might have hope of creating some standing waves and dispelling their smoke screens.

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DOWN IT GOES

As a high-pitched sound is originated when the bulb is pressed, the dust collects in layers and then falls to the bottom of the chamber.

PHYSICS

Sticks to Old Viewpoint to Interpret Transmutation

Professor Bohr Surprises Physicists With Idea That Nucleus Has Temperature and Use of Thermodynamics

INTERPRETING the transmutation of the elements, by the changing of their atomic nuclei, must be considered from the old statistical point of view of thermodynamics rather than exclusively by the newer quantum theory, said Prof. Niels Bohr of the Institute of Theoretical Physics at Copenhagen, speaking at the meeting of the American Physical Society.

Prof. Bohr, one of the world's great physicists, is a past winner of the Nobel Prize and best known for his atomic model called the Bohr atom. This model and the relatively simple theory which produced it are no longer used in the front rank of thinking on atomic problems, but at the time of its inception more than 24 years ago it was a major forward step in science.

Prof. Bohr believes that modern atomic theories which treat the behavior of individual atoms, particles and nuclei are bound to fail when used on heavy atoms like lead which contain over 200 protons and neutrons in the nucleus. One must, he indicated, revert to the well-known laws of thermodynamics which have been used for 100 years to treat physical phenomena where a large number of particles are involved.

In barest outline Prof. Bohr examines, mathematically, a heavy atom like lead, forgets its individual internal particles and treats it as though it were a tiny drop of water or mercury with a myriad of particles in it. Such a theoretical droplet of nucleus would have such an enormous density that if it were as large as one cubic centimeter, its weight would be over 100,000,000 tons.

Under normal conditions, Prof. Bohr shows, the tiny droplet may be thought of being at a fairly low temperature.

During experiments in which such a nucleus is bombarded with neutrons, however, the first effect of the impact is to raise the effective temperature to the inconceivably high level of some 50,000,000,000 degrees Centigrade.

At such temperatures the particles within the nucleus, suggests Prof. Bohr, go into a state of violent thermal agitation. Some of the nuclear particles will "evaporate" and be hurled off with energies amounting to several million volts.

As soon as excess energy is liberated in this fashion the nucleus will "cool" down to lower temperatures and the evaporation will cease. Any residual energy will be radiated in the form of gamma rays until the nucleus has cooled to its normal temperature.

The main point of Prof. Bohr's new thinking on atomic physics which interests and even shocks some physicists is the idea that a nucleus can be thought of as having a temperature and that the evaporation of particles can be treated by thermodynamics.

By making detailed calculations based upon this idea Prof. Bohr was able to explain a number of phenomena which have been observed to take place when atoms undergo transmutation from one kind to another. In carrying out his calculations Prof. Bohr finds it necessary to use some of the ideas inherent in the more modern quantum mechanics. There is little doubt that the new Bohr theory, if proved successful, will be quickly accepted and welcomed by all physicists.

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