

PHYSICS

Atomic Fission Takes Place In Sun's Corona, Is Theory

Would Account for Mysterious "Forbidden" Lines in Spectrum of the Corona Due to Stripped Atoms

ATOMIC fission similar to that of Uranium 235, on which hopes of atomic power on this earth are based, takes place in the sun's corona, that system of luminous streamers that surrounds the sun and is visible only at a total solar eclipse.

This is the theory proposed by the eminent Indian scientist, M. N. Saha, University College of Science, Calcutta, in a letter to the British scientific journal, *Nature* (May 9).

The cracked atoms, stripped of many of their outer electrons, originate, according to the theory, in the layers below the corona and are hurled outward with terrific velocities. As they travel they knock off electrons right and left from the atoms they encounter, themselves alternately gaining or losing an electron as often as a thousand times in a distance of one centimeter (about 0.4 of an inch). Loss of energy through the frequent collisions finally brings the streaking fragments to a halt.

This theory accounts for a number of things hitherto obscure. The outer corona is generally believed to consist entirely of free electrons. But the origin of these electrons was never until now adequately accounted for. Mysterious "forbidden" lines have been observed in the spectrum of the corona. Many of these lines were found to be due to atoms of iron, nickel and calcium that had been stripped of many of their outer electrons. This discovery of Grotrian and Edlen, which Dr. Saha confirmed, was thought to com-

plicate the theory of the solar corona. But it fits right into Dr. Saha's theory.

His idea is that these atoms are the result of a cracking process like the fissions of uranium, thorium and protactinium, which have been carried out on the earth. The idea is supported by recent experiments at Prof. Bohr's laboratory at Copenhagen by Boeggild, Lauritsen and others. The experimenters found that fission fragments are hurled apart

with velocities of about 9,000 miles per second, $\frac{1}{20}$ that of light, which are greater than the velocities of the outer electrons in their orbits. Consequently these electrons are left behind and the fission fragments become highly stripped atoms. It is as though the sun should be suddenly whisked away, leaving its planets behind.

The forbidden lines observed in the sun's corona, forbidden because they do not occur under ordinary earthly conditions, are broad. This broadness indicates a velocity of about 60 kilometers (36 miles) per second. This is the velocity, Dr. Saha says, which they have slowed down to by the time they get far enough out into the corona for their lines to be observed. Everything thus seems to jibe with observations in Dr. Saha's theory of the solar corona.

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CHEMISTRY

2,682 Ships Would Be Needed To Bring In 5 Products

JUST five of the many vital war products now being produced synthetically in this country would require 2,682 good-sized cargo ships to bring a year's supply from overseas. They would form a bridge of ships across the Atlantic spaced a trifle over a mile apart. This is an estimate made by E. I. du Pont de Nemours & Company.

The five products are nitrates for explosives and fertilizers, rubber, dyestuffs, textile fibers, and camphor for medicinal use and manufacture of many essential chemicals.

Of these five, only nitrates would still be obtainable if the ships could be spared. Chile was formerly our chief source. Now we are making nitrates from nitrogen

drawn from the air. The other four products came from countries now in enemy hands.

Ninety-five per cent of our rubber came from countries now dominated by Japan. Most of our dyestuffs formerly came from Germany. Silk came from Japan, and most of our camphor came from the Japanese island of Formosa.

The synthetic production of these products in our own country with our own materials will not only help to win the war, but make us independent of foreign world-wide monopolies after the war.

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