

NUCLEAR PHYSICS

Superbombs Due for Tests?

Three or four superbombs will probably be tried. AEC research is now gleaning the basic information needed for the hydrogen bomb.

➤ THE big question about the superbomb—or superbombs—is how soon it can be built and tested.

Plans and research for superbombs have been in the AEC laboratory, if not actually on the drawing boards, for at least three years, possibly more.

There will probably be at least three or four superbombs tried. For there are several atomic reactions that have in them engaging amounts of mass that can be transformed into energy, if conditions such as millions of degrees temperatures and split-second reaction are fulfilled. For instance, there is the well-recognized combination of two atoms of deuterium, the D-D reaction, which is favored in the speculation because it happens at a lower temperature than most, a mere million degrees or so which an ordinary fission (uranium or plutonium) bomb could provide as a fuze.

Equally inviting in the tables of energies of disintegration of atoms (in any science library) are such reactions as that in which an ordinary atom of lithium is combined with an atom of deuterium (heavy hydrogen) to make one of the kinds of beryllium atoms and give off a neutron. This actually releases five times as much energy as the D-D reaction. Beryllium, another light metal, also could produce lots of energy if it combined with deuterium.

NUCLEAR PHYSICS

Bomb Threat to Civilization

➤ "BEFORE deciding whether it should be made, the American people must be aware of the fact that a bomb 1000 times stronger than the Hiroshima bomb might easily destroy civilization."

This warning comes from Dr. Hans Bethe, of Cornell's Laboratory of Nuclear Studies, famous for his theory of atomic energy transformations that keep the sun and stars stoked. Dr. Bethe made his comment in response to a request for an evaluation of the supposed superbomb possibilities, and it was prepared before President Truman's Jan. 31 statement that superbomb work would continue.

"The D-D reaction is theoretically capable of releasing substantial amounts of energy," Dr. Bethe said. This reaction is between the hearts of heavy hydrogen, the atom of mass two called deuterium, a process first discussed 15 years ago and believed to be basic to the so-called hydrogen bomb.

The scientists have many combinations to try. There is also a plentiful supply of these light chemical elements to use if the superbombs go into production—much more of them than uranium.

AEC Research

The Atomic Energy Commission through its researches on the nuclei (hearts) of light elements is getting the basic information needed for the hydrogen bomb. This is made clear in the seventh semi-annual AEC report to Congress.

The simplest of all interactions between atoms—two protons or hydrogen hearts smacking into each other—is occupying the time of two atom smashers at Berkeley, Calif. Scientists admit that they do not yet have a satisfactory mathematical description of the force between protons and that present theory must be modified.

Atoms of mass three, both of hydrogen and helium, are being produced at Argonne Laboratory, near Chicago, because they are so useful in investigations.

Interactions between protons, deuterons, tritons, helium 3 nuclei, and alpha particles are being studied. Deuterons, which are mass 2 hydrogen atomic hearts, reacting with each other provide the simplest energy-releasing reaction so far suggested as the basis of the so-called hydrogen bomb (See

SNL, Feb. 4, p. 69). The fact that the report mentions them is considered interesting, although the so-called D-D reaction is not specifically mentioned.

Other innocuous-sounding experiments reported are aimed at understanding how atoms interact to form molecules. Hydrogen is being used because it makes the simplest of molecules. The three kinds of hydrogen, masses 1, 2 and 3, produce six different kinds of hydrogen molecules when they combine two and two. Scientists are catching the spectra (rainbows) of these various molecules to determine the motion of electrons within them. These motions are responsible for the inter-atomic forces which come into play to hold matter together or split it asunder.

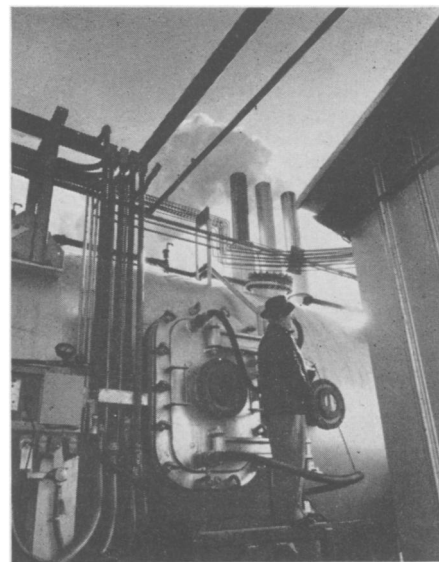
Scientists can split an atom and manufacture matter heavier than any they had in the beginning. University of California accelerators have produced atomic "chips" consisting of three protons which have been glued immediately into another element, making it gain three mass units. This may find application in the manufacture of new kinds of elements of practical worth, just as plutonium is now manufactured out of non-fissionable uranium.

Science News Letter, February 11, 1950

AERONAUTICS

Test Chamber Simulates Air Speeds and Altitudes

➤ TESTING chamber for ram-jet engines, in which air speeds of 2,600 miles an hour can be obtained and altitude conditions up to 80,000 feet simulated, was revealed by



TEST CHAMBER—The center section of the test chamber shows the access door and some of the lead-ins for instrumentation lines. The two hoses attached to the door are part of a cooling system which jackets the entire chamber with a layer of water.

Science News Letter, February 11, 1950

the Wright Aeronautical Corporation in Wood-Ridge, N. J. It was developed for the U. S. Air Force.

The test chamber is 12 feet in diameter and 96 feet long. Air, supplied by turbine compressors in the adjacent turbine laboratory, is directed at supersonic speeds through a mouth, 20 inches in diameter, at the front of the chamber into the air intake duct of the ram-jet engine. Pressurized steam, at the rate of 150 tons per hour, is vented into the chamber's exhaust system to aid in the escape of exhaust gases and to reduce pressure in the chamber, thereby simulating high-altitude conditions.

Ram-jet engines are used as supplementary power in speedy planes. It is the simplest engine in use and provides more

thrust per pound of engine weight than any other type of aircraft power plant. However, it can not operate in flight until sufficient speed has been obtained to enable it to scoop up enough air for combustion. The speed of the plane on which it is used provides the necessary speed.

It can be used in a missile when given initial speed by rockets. In stationary position on the ground, it operates only when high-speed air is forced into its air intake. The ram-jet has been called a "flying stove pipe," because in its simplest form it is a hollow tube in which combustion takes place. The engine itself, exclusive of the fuel system, has no moving parts and consequently needs no lubrication.

Science News Letter, February 11, 1950

University Aeronautical Laboratory, to the Institute of the Aeronautical Sciences.

Made from three sheets of aluminum, the thin man helps to determine the effectiveness of body control devices in airplanes and measure head impacts during crashes.

Science News Letter, February 11, 1950

● RADIO

Saturday, February 18, 3:15 p. m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Mr. Davis will interview nine talented teen-aged youngsters, winners of Washington trips in the Ninth Annual Science Talent Search.

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MEDICINE

Aureomycin Fights A-Rays

➤ AUREOMYCIN, the golden-yellow drug from a mold, may become one of our best weapons against atomic bombs.

It has already shown ability to cut the death rate from killing and near-killing doses of radiation in rats and dogs.

This "highly important advance" in medical defense against death from the radiation effects of atom bombs was made at the Atomic Energy Project at the University of Rochester (N.Y.). It was disclosed in the report of the Atomic Energy Commission.

Following this discovery of aureomycin's anti-radiation effects, the effects of other antibiotics, such as penicillin and streptomycin on acute radiation sickness are being studied.

These drugs had already been considered as valuable medical weapons in case of atomic attack because of their ability to control infection. Persons damaged by radiation are markedly sensitive to germ infection. Many of the Japanese victims at Hiroshima and Nagasaki developed extensive

ulceration and blood poisoning because of this post-radiation sensitivity to infection.

Lead shields around the spleen and inhalation of nitrogen instead of air are other measures which AEC scientists found decreased the death rate in experimental animals. Lead belts, reminiscent of gangsters' bullet-proof vests, might be worn by anyone expecting an atomic attack but breathing nitrogen instead of air is hardly practical, since it would lead to death by suffocation instead of by radiation.

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AERONAUTICS-ENGINEERING

Sheet Metal "Thin Man" Used in Test Crashes

➤ A "THIN man" built out of sheet metal can test the stresses on the human body that occur during an airplane crash. The thin man was reported by E. R. Dye, head of the development division of Cornell

Question Box

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What is the latest method for fighting caries? p. 92.

GENERAL SCIENCE

How many boys and how many girls were STS winners? p. 85.

MEDICINE

Against what is ACTH now being used? p. 92.

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METEOROLOGY

What leading scientist thinks that rain-making is a probable solution to the water shortage? p. 87.

NUCLEAR PHYSICS

What are possible atomic reactions that might be utilized in making superbombs? p. 83.