

Tritium, hydrogen of mass three, has been assumed to be a necessary ingredient of the H-bomb. In 1950, President Truman ordered full speed ahead on the H-bomb. At a cost of over a billion dollars, the Savannah River plant was built primarily for tritium manufacture. (Tritium is made by bombarding lithium with neutrons from uranium or plutonium fission in an atomic reactor.)

Tritium is a gas in its elemental form, and a radioactive gas at that, half of it disintegrating in about 11 years. A most inconvenient material to put in a bomb, it is highly unlikely that it is used as a gas.

A chemical combination of lithium and ordinary hydrogen, lithium hydride, is a relatively common and solid chemical. Anyone can buy it. Lithium tritide should be a very similar solid and would combine in easily handled form two of the most fusible elements.

Lithium deuteride would be similar and

very much cheaper. No uranium would be consumed if this compound were used because the one part of deuterium in about 5,000 of water is extractable. It might do just about as well in the H-bomb. Thus there may be H-bombs without tritium. If that is true, H-bombs are little more costly than plutonium bombs and all the bombs can be rebuilt to be in the megaton range.

These are the questions being answered by the tests in the Marshall Islands. We can only guess at their answers.

It is unfortunate that the chapters in scientific history being written in secret reports can not be known, for they would be fascinating reading. The price that is paid for military security is the foregoing of the fruits of the great international interplay of scientific facts broadcast freely throughout the scientific world. Out of such freedom of science the atomic age was born.

Science News Letter, April 17, 1954

be easily acted upon and transmuted in bulk as would be necessary for an 'end-of-the-world' disaster.

"If there was believed to be any considerable risk to an atmospheric or oceanic chain explosion, it is very likely that even the Russians would think a long time before risking a test. We must assume that since they seem to want to have a communistic world, they will not risk anything that they believed would envelop the earth in flame."

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Theoretically, the longest possible time that a total *eclipse* of the sun can last is seven minutes and 40 seconds.

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Explosion of World?

► CAN THE world be exploded like a gigantic atomic bomb and turned into a flaming star-like object with all life extinguished? This question has worried the world ever since discussion of atomic energy began.

Despite the tremendous size of the hydrogen bomb already achieved and the possibilities of even larger explosions, there is no danger of setting off a chain reaction which would destroy life on the earth. The answer to this problem of the annihilation of the earth is "no," just as it has been in the past.

Perhaps we can do no better than to repeat what has been said before. On Jan. 30, 1939, at the time when the fission of uranium first became known, it was not only possible to predict definitely that there would be an atomic bomb, but to report at that time (see SNL, Feb. 11, 1939, p. 86):

"The physicists are anxious that there be no public alarm over the possibility of the world being blown to bits by their experiments. Writers and dramatists (H. G. Wells' scientific fantasies, the play 'Wings Over Europe,' and J. B. Priestley's novel, 'Doomsday Men') have over-emphasized this idea. While they are proceeding with their experiments with proper caution, they feel that there is no real danger except perhaps in their own laboratories."

More recently, in 1950, just after President Truman authorized the construction of the hydrogen bomb, this problem was discussed in more detail (see SNL, March 4, 1950, p. 133):

"Not even a monster super-H-bomb, the most gigantic that can be visualized, would explode the atmosphere of the earth or the waters of the oceans, ending life on the earth as we know it.

"That is the best judgment of scientists, despite the alarming statements of a few

physicists. The damage that a dozen or so H-bombs could do to big cities is quite alarming enough without calling upon a chain reaction in the atmosphere or the seas.

"There is energy (excess mass that turns into energy) when hydrogen, oxygen and nitrogen of the air and water are transmuted to other elements. That is clear and no scientist disputes this fact. But in the explosion of an H-bomb there is even less than in an A-bomb of the sort of radiation and other debris that would propagate a chain reaction, particularly in the light elements.

"In the H-bomb the process is more of a combination of the light-weight elements involved to make other elements with an incidental loss of mass or matter, which turns into energy. This is what is called fusion. In the uranium-plutonium atomic bomb it is a matter of these two very heavy elements splitting into other middle-weight elements, with a slight loss of mass that turns into energy. This is called fission.

"In fission of the A-bomb, neutrons in excess are let loose and this makes possible the extremely rapid chain reaction. Probably neutrons do not have such a key role in the so-called hydrogen bomb, which seems to be a matter of smacking together the atoms of the hydrogen isotopes, deuterium and tritium (double and triple weight hydrogen), one or the other or both.

"To set off a chain reaction in the atmosphere or in water, something to react with the oxygen and hydrogen of the water and the nitrogen and oxygen of the air would have to be produced in profusion. This does not seem to be provided by the H-bomb if guesses as to its nature are correct.

"Not only that, but if the triggers or inciting radiations were present, the atoms of the air and water are too far apart to

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