

## CHEMISTRY

# Bomb Products Are Known

Chemists have determined what the products of the fission of an atomic bomb are. Element 61 is yet to be named. Other research is reported.

*Highlights of the annual American Chemical Society meeting, held last week in Atlantic City, N. J., are presented in this issue.*

► **JUST WHAT** happens when an atomic bomb fissions and what chemical elements are formed in the big smash-up or uranium 235 atoms are now known.

The American Chemical Society meeting in Atlantic City, N. J., was told by Dr. Aristid V. Grosse, now of the Houdry Process Corp., that 34 different elements have been detected among the fission products of the kind of uranium that can be made into a bomb.

Four elements, neodymium, barium, zirconium and molybdenum, account for nearly half of the weight of the uranium split asunder with great release of atomic energy. More than 10% of the weight reappears after the fission in each of these elements.

Two elements that do not occur naturally, because they are radioactive and thus destroy themselves, are produced in substantial amounts in uranium fission. These are element 43, recently named technetium, and element 61, as yet unnamed.

For each hundred pounds of uranium 235 fissioned, 2.6 pounds of technetium and 4 pounds of element 61 are produced.

This means that at Bikini, where two bombs were exploded, several pounds of each of these hitherto non-existent elements were manufactured and let loose in the world.

The chemists determined the amounts of elements formed by measuring the results of controlled fission or production of atomic energy in the large structure, called an atomic pile, in which slowly moving neutrons (electrically neutral atomic particles) cause the splitting of the uranium atoms in a controlled manner. The results should, however, apply in essential features to fast neutron fission such as occurs in the atomic bomb, whether it is made of uranium or plutonium.

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## Element 61 Naming Delayed

Christening of element 61 was expected to take place at this meeting but has been delayed probably until the fall meeting of the American Chemical Society. The discoverers of the element,

who worked together on the Manhattan atomic bomb project, are not yet ready to decide on the name since some of the information they wished to announce at the same time is still being kept secret.

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## Radioactive Chlorine

Chlorine, one of the elements in common salt, can be made so radioactive by exposure to neutrons in the atomic pile that one radioactive form of it will keep on giving off radiation for more than a million years. Dr. Ralph T. Overman, of the Monsanto-operated Clinton Laboratories at Oak Ridge, Tenn., reported on four activities produced by very long neutron irradiations of various chlorine compounds in the Clinton Laboratories chain-reacting pile.

Since Bikini bombs bombarded the salty sea water with neutrons, this means that some of the radioactive chlorine produced has a half-life of a million years and the effects of the Bikini bombings will be felt in this way for longer than a million years.

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## Steel Wastes Combined

Once in a while marriage of a pair of wastrels results in the reform of both of them. Something of this sort may be realized in the chemical world by the combination of two troublesome waste-products of the steel industry, coke oven ammonia and spent pickle liquor, proposed by Dr. Richard D. Hoak of the Mellon Institute of Industrial Research, Pittsburgh.

Pickle liquor is a sulfuric acid solution used to remove oxide scale from new steel. At the end, it still contains some uncombined acid, together with a quantity of mixed iron compounds. Dr. Hoak's suggestion is to run the ammonia into the spent pickle liquor, producing ammonium sulfate, which is valuable in both agriculture and industry. The iron residues he would put back into the blast furnace, for re-extraction.

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## Oleomargarine Good Food

The perennial dispute over oleomargarine came in for another round of discussion in a paper by Dr. Paul Gyorgy of the University of Pennsylvania school of medicine. He pointed out that in feeding experiments laboratory rats thrived just as well on skim milk



**NAVY TRANSPORT**—This helicopter, recently unveiled by the Navy, was designed during the war for rescue work. It can travel 100 miles an hour and carry a crew of two plus eight passengers.

with added soybean oil as they did when the supplementary fat was butter.

"In the light of these and similar observations," he declared, "generalized

discrimination against vegetable fats, including margarine and 'filled' milks, does not appear to be justified."

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#### CHEMISTRY

## Usefulness of Adsorption

► ADSORPTION, the less-known physical twin of absorption, may become a more familiar word in everyday English because it is finding an increasingly important role in chemical industry. At the meeting of the American Chemical Society in Atlantic City recently, Drs. Alfred E. Hirschler and Senta Amon of the Sun Oil Company told how adsorption is used in purifying high-grade petroleum products.

As everyone knows, a liquid is absorbed into a porous object, like a sponge or a blotter, by being drawn into its fine cracks and fissures. A liquid or a gas is adsorbed, not into a solid, but simply onto it. Its molecules cling to those of the solid surface with an almost unbreakable attraction; it is the "stickin'-est way of sticking". The adsorptive force can be broken by various means; one of the simplest is by heating.

In purifying high-grade hydrocarbons, the mixture containing them is contacted with a finely divided substance that presents a maximum amount of surface per cubic inch, like carbon or silica gel. Certain kinds of molecules are adsorbed; others are not, and can be drawn off. Then the adsorbed molecules can be freed, without so many strangers in their company.

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### Calcium Carbonate in Paint

Girls singing the old opera favorite, "I dreamt that I dwelt in marble halls," may now mean nothing more than that the rooms of their family dwelling-places have been properly painted. For the chemical substance that in polished slabs is marble, calcium carbonate, is useful in microscopically divided form as a paint extender, Dr. H. W. Siesholtz of the Witco Chemical Company, told the meeting.

Instead of grinding up marble or limestone to get for this purpose, calcium carbonate is made by chemical precipitation. This makes the particles exceedingly small—a hundred-thousandth of an inch or less. The smaller

the particles the better they will spread in paint, and the better they will reflect light from the finished surface.

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#### CHEMISTRY

### More Sulfur Grows Bacteria To "De-Smell" River Water

► SO MANY rubber manufacturing plants were dumping their wastes into the Ohio river during the war that it created a serious problem for cities down-stream that had to take their drinking water out of it. Plainly stated, it stank, and indignant citizens demanded that something be done about it. What Dr. Herbert Fleischmann, of the Covington, Ky., filtration plant did was dump powdered sulfur into the storage basins. This encouraged the growth of bacteria that feed on sulfur, and while they ate up his gifts of free sulfur they also devoured the smelly, sulfur-containing wastes that were making the trouble.

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#### CHEMISTRY

### Too Little Soap Means Work in Washing Clothes

► TOO LITTLE soap used in the laundry means more work in getting the clothes clean, Osborne C. Bacon and J. Edward Smith, of the E. I. du Pont de Nemours & Co., told the meeting of the American Chemical Society in Atlantic City, N. J.

Using a miniature washing machine that measures the soap and the amount of power used, the scientists found that up to a certain point higher concentration of the soap lessened the time and force needed to wash the clothes satisfactorily.

Cutting the concentration of soap in half doubles the amount of work needed to get the same result. For a 20-minute washing period, if only half the proper amount of detergent is used, twice as much work is required to remove the same amount of soil.

"Soap does not remove dirt in a washing machine," Mr. Bacon stated. "It is the work, not the soap, which actually removes the dirt. The soap has done all its cleaning work before the machine starts, for the soap loosens the dirt and the mechanical action of the washer takes the dirt off, then the soap prevents the dirt from going back onto the cloth. This action of soap makes the clothes white. Where there is insufficient soap in suspension for this preventive action, the clothes usually turn out gray.

"Mechanical action and soap are independent. They do their work alone, not together, although both are needed for clean clothes." Beyond a certain concentration, the addition of more soap does not remove any more dirt, or speed up the cleansing operation."

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#### FOOD CHEMISTRY

### Mild Cooking Improves Chicks' Soy Bean Food

► YOUNG CHICKENS and turkeys may come to market sooner as the result of being fed soy beans, agricultural and food chemists learned at the opening session of the American Chemical Society meeting in Atlantic City, N. J.

Mild cooking improves soy beans as food for young chickens, Dr. Robert John Evans of the division of chemistry and Dr. James McGinnis of the division of poultry husbandry, both of the Washington Agricultural Experiment Station, Pullman, Wash., reported. However, longer cooking under greater pressure makes the soy preparation less valuable as a source of protein for the growing chicks.

The chemists added known proteins to the feed of the chicks getting the overcooked meal, until they learned which ones gave as good growth diets as the soy meal that had had less cooking. They also digested the feeds in test-tubes. From these tests they learned that long pressure cooking destroys 30% of the lysine in the soy preparation, and 40% of the cystine, but leaves the methionine unharmed. All three are necessary for good growth of the poultry.

Further data to show that short cooking and low pressure is the best method for preparing soy bean diets comes from Drs. J. C. Fritz, E. H. Kramke and C. A. Reed of the Borden Co., whose tests with young turkeys show that more methionine makes them grow faster.

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