by first adding to the nucleus of its atom a neutron, to make it so heavy that it would become unstable, then by allowing this heaviest uranium atom to shoot an electron out of its structure. This loss of electrons from the total quantity of uranium showed itself as a phenomenon familiar to scientists as the beta ray. It is the peculiar nature of radioactive elements to change into something else when they emit beta rays, and that something else is, oddly enough, not a lighter but a heavier element.

Accordingly, when uranium 239, formerly the heaviest known element, emitted its beta ray it changed into a still heavier element, which the scientists working with the material named neptunium. Neptunium proved to be a rather unstable element, and emitted a beta ray in its turn. This change in the atom turned neptunium into another new element, which was named plutonium. The names of these three elements are taken from the three farthest planets of our solar systm.

Plutonium turned out to be a fairly stable element, about whose chemical properties enough was soon learned to prove that chemical separations of this new material from its parent uranium would be a relatively easy task. Plutonium does not readily follow the pattern by which it was formed, but makes the opposite transformation by which it gives off an alpha ray and turns back into uranium 235. This, however, happens so slowly that there is plenty of time for the atom-splitting reaction of plutonium to do its work.

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CHEMISTRY

Rubber Goods Produced In Tremendous Quantities

➤ SOME idea of the tremendous wartime production of rubber goods for the armed services may be gleaned from a report by the Rubber Manufacturers Association. Tires are but a single item. Equally essential, perhaps, are rubber boots for troops, battery cases, rubberized textiles, heels and soles for shoes, and rubber pads for tanks, aircraft and battleships.

More than 30,000 different rubber products were manufactured for war uses. Some were made from the limited supply of natural rubber, some entirely of synthetic rubber, and others of a combination of the two. The production program was hampered to some extent by the necessity of manufacturers and workmen learning how to use the new synthetic raw material.

Tens of millions of tires for land, air and amphibious vehicles have been produced since the beginning of the war, the report states. Over 45,000,000 pairs of rubber boots and shoes have been made, and some 10,000,000 hard rubber battery cases. More than 150,000 pounds of rubber compound is used in each new battleship. Over 360,000,000 yards of rubber-coated fabrics have been produced. Thousands of other rubber needs have been met.

Rubber industries had considerable natural rubber to use the first two years after Pearl Harbor, with some 600,000 tons of it on hand in December, 1941, and additional on boats on the sea. In three months the Japs controlled 90% of the world's sources of natural rubber. The first pound of synthetic rubber from the first plant in the joint government-industry program was produced on May 18, 1942. New synthetic rubber is being produced at a rate of over 700,000 tons a year. War needs have been met, and some rubber is available for the more essential civilian needs.

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