

PHYSICS

Smallest Quantum Larger

Measurements made with the help of X-rays prove that the tiniest unit of energy is somewhat greater than former measurements indicated.

► THE SMALLEST "quantum" of energy, the amount that would be emitted by a single atom making one vibration per second, if that were possible, has been somewhat enlarged by new measurements made with the help of X-rays. The measurements were carried out by the physicist, Prof. Per Ohlin of the University of Uppsala, Sweden, and are reported in the current issue of the British journal of science, *Nature*. (Sept. 18)

Previous measurements by this method gave results 0.3% to 0.4% smaller than those calculated from the atomic theory and other experimental data. The discrepancy was due, Professor Ohlin pointed out, to the difficulty of determining just where the X-ray spectrum ends on the short wave side, which is the principal observation required by this method. This is as difficult as, or more difficult than, determining precisely where the edge of a rainbow is, especially on the blue side.

A more precise way of determining this limit removed the difficulty and gave results in satisfactory agreement with those calculated from the atomic theory.

The quantity determined by this method is not directly the smallest quantum, Planck's radiation constant as it is more familiarly known to the physicist, but its ratio to the smallest electric charge,

h/e . Professor Ohlin's final result for the ratio is 1.3787 divided by 10^{17} (1 followed by 17 zeros) which is the same, within the limits of experimental error, as that derived from the atomic theory. Since the smallest charge, e , is known h is readily found.

To find the precise point where the X-ray spectrum fades to nothing, the method had been to use a narrow band of the spectrum near the end and measure its increasing intensity as the voltage was raised. A curve of these intensities was then plotted, and the curve was extrapolated downward, continued by the eye, to the level of zero intensity. This should have given the voltage at which that particular band of X-ray frequencies began to be emitted, but it didn't quite.

Professor Ohlin, by using a much narrower band and changing the voltage by very small steps (2 volts), which was made possible by the use of a more powerful and efficient X-ray apparatus, found an irregularity at the lower end of the curve quite undisclosed by the previous coarser measurements. This accounted for their failure to get a result in agreement with that derived from the atomic theory, which result is thus confirmed and may be taken to be correct together with the theory and measurements on which it is based.

Science News Letter, December 4, 1943

MEDICINE

Fast Syphilis Treatment

Two speeded methods are giving good results, report of the first year of their use at a Chicago center shows. Patients usually complete course of treatment.

► GOOD RESULTS with two of the modern fast methods of treating syphilis are being obtained at the Chicago Intensive Treatment Center, it appears from a report of the first year of the Center's operation. (*Journal, American Medical Association*, Nov. 27)

A total of 931 patients, all of whom submitted voluntarily to the treatment, were given the so-called one-day treat-

ment with fever and chemicals. Actually they are in the hospital seven days. During one of these days they spend seven hours in the fever cabinet. A single dose of bismuth is given 24 hours previously and while the patient is in the fever cabinet, three doses of an arsenical are given.

Of these 931 patients, two died. Following the second death the treatment

was modified somewhat and in the next 242 consecutive cases there were no deaths. There were relapses in 49 patients, just over one-fifth. The dosage of the arsenical drug was then increased somewhat, and in the last 488 patients there have been no deaths and only eight relapses.

Another 390 patients were given intensive chemical treatment without fever. They are given the arsenical twice daily for seven days and bismuth once every second day for four doses. They remain in the hospital for two weeks. There have been no deaths in this group. The re-

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lapse rate at first was about one-fourth that of the combined fever and chemical group. A number of severe reactions, however, made it necessary to modify this treatment also. The interval since has been too short to allow any conclusion about the 280 treated by the modified method.

Chief advantage of the new methods of treatment is that, with few exceptions, the patients complete the course of treatment. Under the old scheme of syphilis treatment, requiring weekly visits to doctor or clinic for 18 months, many patients failed to finish the course. They not only were not cured themselves but continued to be dangerous to others.

Gonorrhea as well as syphilis is treated at the Center, sulfathiazole, with fever treatment when necessary, being used.

The Chicago Intensive Treatment Center is operated under grants from the Federal Works Agency, the U. S. Public Health Service, the State of Illinois and the Chicago City Council. This report of its first year of operation is made by Dr. Herman N. Bundesen, president of the Chicago Board of Health; Dr. Theodore J. Bauer, U. S. Public Health Service, venereal disease control officer for Chicago; Dr. H. Worley Kendell, U. S. Public Health Service, director of the Center and one of the originators of the one-day, combined fever and chemical treatment of syphilis; and Dr. R. M. Craig, Dr. G. X. Schwemlein, E. C. Sittler, Dr. M. F. Steves, Dr. E. A. Strakosch, Dr. A. A. Rodriguez, Dr. N. D. Shaw, Dr. Jack Rodriguez, and Dr. H. C. S. Aron.

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PUBLIC HEALTH

Directional Finder Shows Where Mosquitoes Breed

➤ A DIRECTIONAL finder for mosquito flights that can help locate where these possible disease carriers are breeding was reported by Lt. (jg) William M. Gordon, USNR, and 2nd Lt. Eugene J. Gerberg, U. S. Army, formerly assistant entomologist with the U. S. Public Health Service, to the National Malaria Society meeting in Cincinnati.

It consists of a mosquito barrier trap, made of four wire screens coated with Tree Tanglefoot, a non-drying varnish, and looks something like a weather vane. The screens are mounted at 90 degree angles to each other, giving two screen surfaces facing each wind direction and forming a barrier plane.

"If mosquitoes were taken only on the southeast side of the southwest screen and on the southwest side of the southeast screen," it was explained, "the mosquitoes must have come from a true south direction. If the prevailing winds happened to have been from the north, we could assume that mosquitoes were breeding south of the trap and were bucking the wind."

The trap does not necessarily serve as a weather vane but instead indicates flight direction, regardless of prevailing winds. Comparative tests showed these traps are as effective as electric mosquito traps.

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NUTRITION

New Link For Diet and Disease Resistance Found

➤ A NEW link between diet and resistance to infection appears in studies reported by Dr. C. A. Mills and Dr. Esther Cottingham, of the University of Cincinnati College of Medicine, at the meeting of the American Society of Tropical Medicine in Cincinnati.

When mice, rats and guinea pigs were starved of vitamins to the point where they failed to grow properly, the activity of their phagocyte cells was likewise reduced, these scientists found. Phagocyte cells play an important part in fighting off infection because of their ability to gobble up disease germs.

The reduction in phagocytic activity was found when the animals were on diets deficient in the following vitamins: thiamin, or B₁; riboflavin, pyridoxine, pantothenic acid and choline, also members of the vitamin B family; and vita-

CONSERVATION

Shortages Cause Research

Lack of sufficient fuel in Great Britain has brought about an intensive conservation program. Gasoline manufacture from coal is increasing.

➤ FUEL SHORTAGES in Great Britain, in wood, coal, oil and gasoline, are directly responsible for an intensive fuel conservation program put into operation early in the war, and also for the establishment of scientific research projects covering both the conservation of fuel and the development of special fuels from English coal. These measures were discussed at the meeting of the American Society of Mechanical Engineers in New York City by W. C. Schroeder of the U. S. Bureau of Mines.

Conservation is being carried out through education and rationing, he stated. The gasoline rationing that the American public endures is mild compared with that in Great Britain. All pleasure driving is banned. Gasoline can be obtained only to go to work in essential industries and where no public transportation is available. Industrial users of coal are cut by nearly 8% of their normal amounts. Home owners are expected to maintain in their houses a temperature not over 60 degrees, and to avoid all waste of heat, water and electricity.

Research projects are those of immediate importance that can be solved quickly, he said. They include the development of producer-gas from coal to propel automobiles, trucks and buses; an efficient mixture of powdered coal

and oil for factory furnaces, and the conversion of coal to oil and gasoline.

Because of the lack of forests, wood or charcoal cannot be used extensively in England for producer-gas as they are in Germany and other countries. Anthracite and high-temperature coke are now yielding a satisfactory gas in Great Britain as a result of recent research. The coke-gas has greater activity when sprayed before using with a sodium carbonate solution.

Colloidal oil, made of a mixture of coal and oil, has been in use in England since World War I, but is more widely used now, perhaps because of better mixtures resulting from recent research. Experimentation in the conversion of coal to oil and gasoline did not start in England as early as in Germany, where research work started in 1913. About 1930, an English chemical company became interested, constructed a plant, and has been in commercial operation since 1935.

"Governmental and scientific circles in Great Britain are now fully awakened to the importance of these processes for making liquid fuels from coal," Mr. Schroeder declared. "It is to be hoped that this same realization of the potentialities inherent in these developments will arise in the United States."

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