

PHYSICS

What Weight Has Neutron? Is Moot Question of Physics

NEUTRON, how much do you weigh?

Physicists are asking that question about the fundamental particle of matter that a relatively few months ago was totally unknown.

The present status of the neutron mass controversy was summarized recently by Dr. R. M. Langer of the California Institute of Technology.

All agree it is almost equal to the hydrogen atom which is 1.0078 on the chemical scale, but it is most important to know whether the neutron is heavier or lighter and by how much. Small differences in mass make big differences in most other things.

The French workers, Dr. F. Joliot and his brilliant wife, the daughter of Mme. Curie, assert the neutron is heavier than hydrogen and equal to 1.012. This explains how protons break up into neutrons and positive electrons, and why the beryllium nucleus is stable. But Dr. Langer pointed out that these assertions are not yet to be accepted as facts and depend on questionable interpretations of experiments.

The English physicist, Dr. J. Chadwick, who discovered the neutron with the aid of preliminary work by the Joliot, chooses the mass 1.0067, which is slightly lighter than hydrogen. His interpretations are well established but the experiments are not very accurate. Dr. Langer believes this value is close but not necessarily exactly right.

A third group, represented by Prof. E. O. Lawrence at the University of California, insists that the neutron is considerably lighter, namely 1.0006. This is claimed because some of their experiments seem to show that the deuteron is unstable and breaks up when it strikes other nuclei. Dr. Langer holds that it must yet be proved that there are no more probable interpretations of their work.

Dr. Langer contends that by far the most precise means of determining the neutron's mass is to use experiments on the disintegration of lithium with deuterons. This process has been carefully studied by Lord Rutherford, Dr. M. L. E. Oliphant and Dr. B. B. Kinsey in England. The scientists measured the

energy of the helium found in the disintegration. From their data, Dr. Langer calculated that the mass of the neutron is 1.0062, which is only 0.0005 less than Dr. Chadwick's guess. This small difference is, however, equivalent to half a million volts.

The mass 1.0062 would mean that the deuteron is stable but would be easily decomposed while the proton might very readily break up into a neutron and a positive electron. Until this question of the neutron's mass is decided, Dr. Langer contended, little progress can be made with the theory of the nucleus.

Science News Letter, January 13, 1934

ENGINEERING

Wet Asphalt Road Not Cause of Most Skidding

WET ASPHALT and tar macadam do not cause skidding as much as other wet road surfaces, despite popular opinion, Prof. R. A. Moyer of the Iowa State College Highway Engineering Department announced as the result of a two-year research of skidding, reported to the Highway Research Board.

The "sand-paper" finish of sheet asphalt, rock asphalt, and asphaltic concrete surfaces was partly responsible for their high resistance to skidding, it was found. Motorists have much more chance of skidding on the so-called "non-skid" surfaces, than on rock asphalt with a "sand-paper" finish, the tests showed.

Tire chains increased the resistance of sleet-covered surfaces to skidding straight ahead but reduced the resistance to skidding sideways. A fairly definite decrease in the tendency to skid was observed with a decrease in temperature. The hot spot on the tire which developed at the higher speeds when sliding straight ahead was found to be more conducive to this kind of skidding in warm weather than in cold weather.

The relative resistance to skidding for the wet surfaces tested, starting with the highest resistance, were as follows: high type asphaltic pavements, tar macadam, asphalt retread and oiled gravel, untreated gravel, portland

cement concrete, mineral surfaced asphalt plank, brick, asphalt penetration macadam with soft seal coat, fine aggregate type asphalt plank, steel traffic plates, hard wood plank, mud on any hard surface, snow, sleet, and ice-covered surfaces.

The skidding propensities of wet portland cement concrete surfaces were found to be 15 to 40 per cent. higher than for the wet high type asphalt pavements. The results for the concrete surfaces were remarkably consistent.

Science News Letter, January 13, 1934

PSYCHIATRY

Weight-Reducing Drug Tested on Mental Cases

THE SAME powerful drug, dinitrophenol, that has been used for reducing weight of over-weight persons may prove of some use in the treatment of the serious mental disorder known as schizophrenia or dementia precox. Drs. J. M. Looney and R. G. Hoskins of the Memorial Foundation for Neuro-Endocrine Research, Worcester State Hospital, Mass., reported to the American Association for the Advancement of Science experiments in which small doses of the drug were administered to the mentally deranged patients.

The rate of using food energy in this disease is ten to fifteen per cent. lower than in normal individuals. Dinitrophenol increases the rate of energy consumption, and the physicians are hopeful that further experiments may show the drug to be practically useful in allaying the mental symptoms by increasing the physical functions of the sufferers.

The drug is considered dangerous to use without very close medical care.

Science News Letter, January 13, 1934

▼ THE FELS PLANETARIUM OF THE FRANKLIN INSTITUTE

**R
A
D
I
O**

an address by

James Stokley

Associate Director in Charge of Astronomy, Franklin Institute Museum

Wednesday, January 17, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.