that the force exerted on them appears to diminish with time. Now the electrical conductivity of grey, crystalline selenium, cooled suddenly from above 200° C., rises to a maximum and then steadily decreases with time. In the condition of maximum conductivity the selenium has pronounced metallic properties, and this suggests that the strongly light-positive selenium is of this kind, and becomes gradually transformed into a more stable and less light-positive modification as time proceeds. Tellurium appears to behave similarly.

In continuation of Arrhenius's work on comets' tails, Schwarzschild applied the theory of light pressure to objects of the order of magnitude of the wave-length of light, and showed that a scattering of the incident energy occurs on such particles. For any one kind of matter there is, as a consequence, a definite size of particle for which the ratio of the impressed force to the incident energy is a maximum. It is interesting to note that Ehrenhaft found a maximum velocity for particles of a substance of a particular size, the critical radius for silver (light-positive) being in accord with the demands of theory, viz. $9{\cdot}8 \,.\, 10^{-6}$ cm. But a maximum velocity exists also for light-negative particles, the critical radius being $26 \,.\, 10^{-6}$ cm. for sulphur and $15 \,.\, 10^{-6}$ cm. for light-negative selenium particles. In the interpretation of light-negative photophoresis, for which no theory at present exists, it must not be overlooked, however, that spherical particles, say, of sulphur or selenium are apparently attracted by the light, even when their dimensions correspond with several wave-lengths of light.

An interesting astronomical application of the phenomenon of photophoresis has been suggested by F. Zerner (*Phys. Zeit.*, xx., 93, 1919) to explain those anomalous comets' tails, which are directed towards the sun. He refers to the observations by I. Schmidt (Athens) of the 1882 comet, and suggests that whereas normal comets' tails may be composed of light-positive matter, it seems equally probable that anomalous comets' tails are made up of light-negative material. Ehrenhaft's laboratory separation of elements by photophoresis would thus seem to have an analogon in astronomy, and doubtless this point will form the subject of much interesting research in the future.

ROBERT W. LAWSON.

STANDARDS OF MASS.

A CIRCULAR recently issued by the United States Bureau of Standards[1] furnishes information concerning the verification of standards of mass and the most suitable forms of such standards for different purposes. An account is first given of the fundamental and national standards of mass of the United States. The standard is the kilogram, from which the pound is derived by the relation 1 lb. avoirdupois = 0·4535924277 kilogram, a relation which shows that the avoirdupois pound of the United States is the same as the British pound. The distinction between mass and weight is then considered, and it is explained that weight is measured in units of force, and that, as it is not feasible for the purposes of metrology to base the unit of force on some concrete standard force, the unit is derived from the established units of mass and acceleration.

The next section of the Circular is a convenient classification of weights, describing the forms recommended for particular classes of work. Weights intended to be of high precision, such as the primary standards of the various States of the Union or reference standards used by first-class manufacturers, are only accepted for verification at the Bureau if they comply with a certain specification as to material, form, and structure. Unless they are made of platinum or a metal which resists atmospheric corrosion, they must be protected by a plating of gold or platinum. Nickel-plating is not allowed. The material and plating must be such that no discoloration appears on the surface of the weights when they are placed in boiling water or when dried at a temperature of 110° C., as is done in preparing them for test. Manufacturers are advised that in machining such weights the knob, top, and sides should be finished first, next the outer rim of the bottom, and then the central portion of the bottom hollowed out by an amount approximately equal to the volume of the knob. The preliminary adjustment should be completed in the last operation.

As regards the adjustment of commercial test-weights, it is of great practical importance that the means of closing the adjusting hole shall be such that the weights can be readily readjusted, but that the operation shall necessarily involve the defacement of the stamp. Various forms of adjusting plugs suitable for such weights are illustrated and described.

The second half of the Circular is devoted to the verification of weights and the reduction of observations. The different methods of weighing are described and the particular purposes are indicated for which each method is most appropriately applicable. Illustrations are given of the various weighing forms in use at the Bureau, and examples of the methods of comparison, as well as of the computations, are set out in a very explicit manner. The important question of the correction for the buoyancy of the air is very fully treated. As regards the determination of humidity, it is pointed out that the hair hygrometer is almost the only form of instrument that can be used inside a closed balance-case. Such hygrometers should not be verified by placing them in saturated vapour, as this leaves them almost worthless for some time. Brief tables for use in the reduction of observations are appended, and the work is concluded by two very convenient tables giving the equivalents of avoirdupois pounds in kilograms, and *vice versa*, from 1 to 999 in each case.

In its present extended form this Circular is a typical example of the useful publications issued by the Bureau, the aim of which is not only to aid scientific investigation, but also to encourage and facilitate the employment of scientific methods in the commercial world.

1 "Design and Test of Standards of Mass." Circular of the Bureau of Standards. No. 3, 3rd edition, pp. 89. (Washington, 1918.)

THE FOLK-SONGS OF THE TETON SIOUX.[1]

THE tribe of American Indians selected by Dr. Densmore for the researches now published is the Teton division of the Dakota Sioux tribe, to which the United States Government in 1868 assigned the portion of territory known as the Standing Rock Reservation, comprising some twenty million acres of the provinces of North and South Dakota. Strictly speaking, "Dakota" is the name applicable to the natives rather than to the region, and the largest division of the tribe or nation was known as Ti'toŋwaŋ, whence the contraction Teton.

The author, who had previously published two volumes on Chippewa music, has now transcribed, with the help of the phonograph, more than six

1 "Teton Sioux Music." By Frances Densmore. Pp. xxviii+561+82 plates. Smithsonian Institution, Bureau of American Ethnology, Bulletin 61. (Washington: Government Printing Office, 1918.)