Ionisation Standards.

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It is very important under certain conditions in radioactive measurements to have an ionisation standard. (See Rutherford's Radioactive Substances and their Transformation, page 111, article 49.) It is also interesting and profitable for students to study the ionising effects of different thicknesses of radioactive substances. (See McClung's Conduction of ElectricityThrough Gases and Radioactive, page 131, article 86. Makower and Giger's Practical Measurements in Radioactivity, page 42, article 30, and Millikan and Milles' Electricity, Sound and Light, page 350, experiment 28.)

McCoy describes a method of making an ionisation standard in the Phil. Mag. May. XI page 176, 1906, and such a standard as determined by Geiger and Rutherford was found to emit 2.37×10^4 α particles per second per one gram of uranium oxide. (See Geiger and Rutherford, Phil. Mag. May. XX page 391, 1910.)

The following is a very convenient modification of McCoy's process ot making such an ionisation standard and a method of preparation of material for student work. A brass rod 36 centimeters in length has a series of shelves

Fig. 1.

arranged spirally about it from bottom to top as shown in Fig. 1. These shelves are about four centimeters apart, and are designed to support small brass disks. The brass disks should each be accurately weighed and arranged in order upon the spiral shelves. Uranium oxide is carefully powdered in a morter and then thoroughly mixed with alcohol in a tall graduate or glass cylinder. The rod supporting the brass disks is next carefully lowered into the mixture of alcohol and uranium oxide. The uranium oxide settles to the bottom, and in doing so deposits a layer upon each disk, the thickness and amount of deposit depending upon the height of the shelf from the bottom.

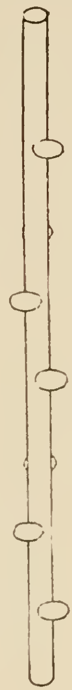

Fig. 1

After all the oxide has settled to the bottom the rod is removed and the disks allowed to dry. By again weighing the disks the weight of the oxide upon each one can be determined. Also by determining the density of the uranium oxide the thickness of the films can be calculated. These disks can now be mounted upon metal plates for permanent use as ionisation standards, or for student use in determining the fact that ionisation currents depend upon the thickness of the layer of material up to a certain maximum thickness.