machines and his wide experience in the construction of tables fitted him well for the task.

It will not be necessary to go into great detail regarding the content of this book since the title gives a very good idea of the principal tables. The present edition retains all the valuable features of the first two editions, and in addition contains certain new tables. Among the latter may be mentioned factorial n up to $n = 100$, and n^4 and $1/\sqrt{n}$ up to 1,000. For the integers between 1,000 and 10,000, inclusive, $\sqrt{10n}$ is given in addition to the usual $\sqrt{n}$. The powers up to the tenth of the first hundred integers and powers up to the twentieth of the first ten integers are given.

Interpolation in the tables of square roots, cube roots and reciprocals is facilitated by the provision of interlinear first differences. The square roots and cube roots have been cut to eight significant figures, a number sufficient for practically all purposes. The computer will appreciate the fact that the publishers have chosen to use clear, easily-read modern type and a good grade of paper.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A CONVENIENT HYDROMETER FOR DETERMINING THE SPECIFIC GRAVITY OF HEAVY LIQUIDS

THE separation of minerals from loose aggregates by using liquids of high specific gravity is a common practice in the study of a variety of sedimentary rocks. Frequently only one cut is made of the aggregate, the desire being to separate the heavy minerals, or those with a specific gravity of about 2.8 and above, from the more common quartz. In such a case bromoform that will float quartz is satisfactory, and the quickest test of density is to drop a grain of quartz in the liquid. In other cases it may be desirable to make cuts between the quartz and some of the feldspars, and then the extreme heavies; or between the quartz and the carbonates; or many other cuts at a variety of values of specific gravity. In such cases it is necessary to know the exact specific gravity of the liquid used, and to control the dilution when preparing a liquid for a specific separation.

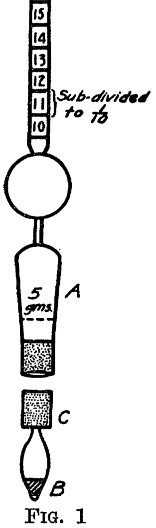

FIG. 1

Various methods have been used by the writer in making specific gravity determinations of heavy liquids. A small picnometer has been used with good success, but the method is tedious and time-consuming. Eimer and Amend, of New York, on the suggestion of the writer, recently prepared a new type hydrometer with which the specific gravity of a liquid between 2.000 and 5.000 can be determined accurately and quickly in one operation. A distinct advantage of the apparatus is that only 5 cc of the liquid is needed for a test. When mixing liquids in small quantities to obtain a required specific gravity, quick determinations are possible with this instrument.

The hydrometer is made of glass tubing with a ball float near one end and just above a liquid chamber *A*. Fig. 1 shows the hydrometer in the inverted position as it is placed in a column of water and the scale is read. A small amount of mercury *B* is used as a balancer, and is sealed in the glass stopper *C* which fits in the liquid chamber. A scale *D* with graduations from ten to twenty-five grams, sub-divided in tenths, is contained in the long glass rod. The liquid chamber or cylindrical bulb is marked to show the level of five grams of distilled water at 20° C. The glass stopper is ground for tight fitting when the hydrometer is inverted in a cylinder of water.

To determine the specific gravity of a liquid which is between 2.000 and 5.000, the liquid chamber *A* is filled with the liquid to the level marked on the bulb, the stopper put in place securely, and then the whole is inverted and floated in distilled water in a tall cylinder. A 1,000-cc cylinder of six or seven cm diameter is satisfactory. The bottom of the meniscus of the water is read on the graduated scale of the long glass tube and this value divided by five (the gram units of the water capacity of the bulb) gives the specific gravity of the liquid.

The instrument may be used for the determination of gravities of solid particles as well, the usual weighing in air and weighing in water being necessary, the balance being the float of the hydrometer in the water. Only two operations and measurements are necessary. (1) Place the solid mineral or rock particle (air dry) in the specimen bulb (which is the liquid chamber *A*), insert stopper and float in the column of water. The value read is the weight of the specimen in air. (2) Put distilled water in the specimen chamber up to the 5 cc mark, and again make a reading with the instrument floating in the column of water. This value is the weight of the specimen in water. Since the weight of the water displaced by the solid particle is the equivalent of the buoyant force on the solid body, and the known capacity of the specimen chamber is five grams of distilled water, the amount of water displaced, or the loss of weight of the specimen weighed in water, is readily determined and the specific gravity of the particle calculated. An example of the calculations is given below:

Weight of dry specimen in chamber	14.3 gm
Weight of full chamber of water	5.0
Total, specimen alone, and water alone	19.3 gm
Weight of specimen in water to the 5 gm marks on bulb	15.6 gm
Amount of water displaced	3.7 gm

$$\text{Specific gravity} = \frac{14.3}{3.7} = 3.86$$

The size of the hydrometer may be a hindrance to some workers. If such is the case, a model one half the length and volume may be used, but for the same range of specific gravity the results will be less accurate.

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REPAIR OF NON-CONDUCTIVE GALVANOMETER STRINGS[1]

THE gilded quartz fibers used in the string galvanometer sometimes lose conductivity without actually breaking. Such fibers may generally be repaired without removing them from the galvanometer. The break in the metallic coating may be located by the use of a single dry cell and a pair of high-resistance head phones. The negative pole of the battery is connected to a string terminal, and under a bright light the string is gently touched at increasing distances from this terminal with a light copper wire connected to the other pole of the battery through the head phones. When the point is reached where a click is no longer heard in the phones, the battery is connected to the opposite string terminal and the process is repeated from the other end to ascertain if the break is confined to one point.

The break in the metallic coating having been located, both string terminals are connected. The repair is then easily made by wetting the positive copper wire with copper sulphate solution and touching the string at the break. Electrolytic deposition of copper will usually restore the conductivity of the string.

Should the break occur exactly under the lenses of the galvanometer microscopes, the slightly roughened string surface where the repair was made may be displaced upward or downward by shifting the entire string by means of a string holder. Ordinarily the repaired strings are not appreciably changed from their original resistance.

CHESTER W. DARROW

[1] Report from the Behavior Research Fund, Chicago: Series B, No. 170.

A SIPHON MOIST CHAMBER FOR MICROSCOPIC MOUNTS

FOR several years the writer has used a method for keeping a water mount continuously supplied with water. The arrangement is so simple that it seems probable that it has been previously used and described and, although the method is original with the writer, no claim of priority is made since it has not seemed worth while to make a canvass of literature. The present note is given to recommend its more general use.

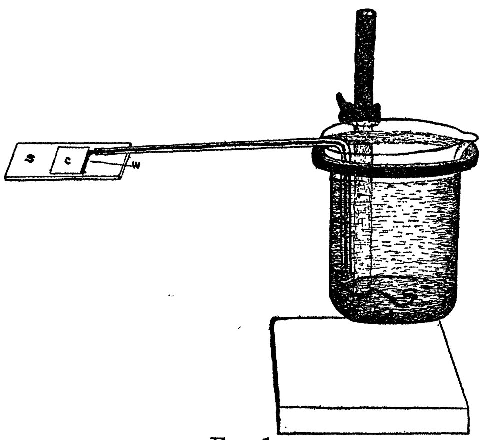

FIG. 1

A glass tube about 25 mm, or less, with a bore of about 4 mm, is bent at right angles about 8 mm from one end. With the aid of a wire, a cord having the texture of candle wick is pulled through the tube leaving about 1½ mm of the cord extending beyond the long arm and several millimeters beyond the short arm of the tube. The cord is thoroughly wet and the end of the short arm with projecting wick is immersed in a beaker of water. The beaker is suspended in a metal ring which is attached to a ring stand so that the beaker may be raised or lowered. The long arm of the tube is supported by the rim of the beaker and its end rests on the slide (s), close to the edge of the cover-glass (c), which is preferably square. The short end of the wick (w) is pressed against one side of the cover-glass. The beaker can be so adjusted that a perfect balance of the flow of water through the wick and evaporation of water from the mount can be maintained so that water is under the entire cover-glass and none extends beyond its edge. If the beaker is elevated too high the slide will become flooded, and if too low the mount will become