SCIENTIFIC APPARATUS AND LABORATORY METHODS

A RAPID METHOD FOR DETERMINING COLORIMETRICALLY THE PH OF SMALL AMOUNTS OF SOLUTIONS

THE chief difficulty encountered in determining colorimetrically the H-ion concentration of small amounts of fluid is that of obtaining uniform small samples. Spotting plates with depressions and small glass dishes are not convenient for frequent use. The pipette described here provides a means of rapidly obtaining uniform samples for color comparisons following a method similar to that proposed by Felton.[1]

A short length of non-soluble glass capillary tubing of about 0.75 mm bore and 2.5 mm outside diameter is fitted into a combined rubber bulb and stopper for each standard solution and indicator to be used. The cross-section area of the capillary is quite constant and each pipette will deliver a drop of almost exactly the same size. At the same time the pipette, Fig. 1,

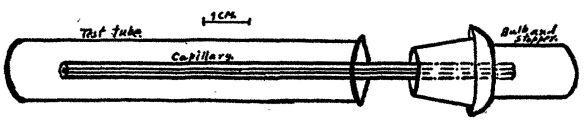

Fig. 1.

serves as a stopper for the test tube or bottle containing the solutions to be used.

The combined drops of standard and indicator will stand up like colored glass beads if a very thin layer of pure white vaseline be put on the spotting plate. This will not affect the pH of the mixture if a good grade of vaseline be used. The comparisons of the colors may be made to ± 0.1 pH. Kymograph paper may be used in place of a spotting plate for classes if it be lightly coated with vaseline.

Standard solutions, of known pH, kept in 12 x 100 mm Pyrex glass test-tubes may be kept for about a year if protected from the light in a box such as is used for filing 4 x 6 inch cards. The tubes may be kept upright by placing them in holes bored in a board placed on the bottom of the filing box. This amount of solution is sufficient for about two hundred determinations. The H-ion concentration may be tested within a very few minutes. A set of standards made in this way requires only a small investment for material as well as being particularly convenient for tests in which the color method may be used. This method has been used by the writer for research[2] and class purposes with complete success for over three years.

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[1] Felton, L. D., *Jour. Biol. Chem.*, 1921, 46: 299.

[2] Richards, O. W., *Jour. Gen. Physiol.*, 1928, 11: 525.

AUTOMATIC, ELECTRICALLY CONTROLLED, TEMPERATURE AND HUMIDITY FRAMES FOR PLANT PROPAGATION

CONSIDERABLE interest is now manifest in high temperature and humidity propagating frames, particularly in connection with the rooting from cuttings of subtropical and tropical fruits. The subject has been of special importance in the multiplication of the lychee, China's most popular fruit.[1]

Accurate control of both temperature and humidity is a simple matter, but no effective device for this purpose in connection with propagating frames has thus far come to the writer's notice. In connection with recent work upon the lychee on the ranch of Wm. A. Spinks, Duarte, Calif., a frame has been devised in which both the temperature and the relative humidity of the air are controlled, the latter by the separate regulation of the temperature of water in a water-pan. The frame consists of a tightly constructed propagating-case with hinged sash. At the bottom is a shallow copper pan for water, the sides of which in this case fit snugly into the frame. Over the pan there is a false bottom of wire mesh upon which the pots or boxes of cuttings are placed. The air is heated by means of electric globes, and the water by means of an electric heater. Air and water temperatures are controlled by separate thermostats. For lychee propagation it is desired to secure an air temperature of 85° F. and humidity of 80. For this the water must be held at 78° F. When outside temperatures do not rise much above 70° F., control of both temperature and humidity is readily obtained. When they rise above this point the water in the pan must be cooled by injecting a stream of cool water through the pan or by spraying the outer surface of the pan with cool water.

Under high temperatures, such as those experienced in the tropics and subtropics, the installation of a refrigeration unit will prove necessary. An experimental frigid frame, using this principle, is now being devised for temperature and humidity control in plant propagation. It is believed that a frame of this kind will not only prove of service for rooting cuttings, but also in hot countries for starting winter vegetables and flowers during the summer months, these to be transplanted in the fall months of lowered temperatures. Details for the construction of the frame will be published from Lingnan University, Canton, China, by Dr. H. S. Frank, who is advising regarding the physical side of the development. The writer will be glad for information concerning similar efforts in this direction.

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[1] Galloway, B. T., *Journal of Heredity*, 13: 201–206, 1922.