

**A SUCCESSFUL APPARATUS FOR DEMONSTRATING
OSMOSIS.**

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The difficulties in the way of demonstrating to classes the effect of osmotic pressure in producing a passage of water from a dilute solution or pure water into a denser solution are well known. During the past few months I have succeeded in arranging an apparatus, a slight variation on that usually and more or less unsatisfactorily used, that gives a very clear demonstration of this action.

Instead of using an animal membrane, which is usually too elastic to give easily visible results, or a parchment-membrane, which is most often subject to trouble from minute pinholes, I used a membrane of ferric silicate supported on parchment paper. The making of this membrane is the chief feature of my apparatus.

In the funnel of a thistle tube I placed about 2 cc. of solid ferric chloride. I then tied over the funnel a piece of wetted parchment-paper. I inverted this apparatus in a mixture of equal parts of commercial water-glass and water, setting it so that only the flat surface was in contact with the water-glass, and not over one-eighth inch below the surface. I kept the apparatus in this position for about twenty-four hours. I then carefully filled the thistle, through the tube, with water, and set it so that it was immersed about an inch deep. After keeping it in this position for another day, I was gratified to find that the precipitate of ferric silicate had completely and strongly sealed the membrane to the bulb.

This apparatus, with the yellow-brown solution of ferric chloride within, showed the rise of water due to osmotic action both quickly and clearly, when set in a beaker of water and adjusted so that inside and outside levels were the same at the start. I have used it repeatedly, and with success each time. The rise in the tube of the thistle-tube has been as rapid in some instances as a quarter of an inch in the first eight minutes and has continued undiminished for two hours. I have not had it in operation for more than this stretch of time at one continuous session.

A great advantage of this apparatus has been the ease with which any accident to the membrane may be repaired. On one occasion a student, handling the apparatus unskillfully,

caused a slight break in the sealing of the membrane. An immersion of fifteen minutes in fifty-per-cent water glass sealed it as tightly as ever.

The apparatus is preserved in a tall jar, with the thistle and membrane immersed in a ferric chloride solution approximately isotonic with that within the thistle. It has remained in good condition and ready for use at any moment, in this solution.

As compared with other membranes, this one has the advantage of being sufficiently rigid so that there is no loss of apparent rise in the fluid within due to stretching by hydrostatic pressure of the solution within. It also is sufficiently speedy in action to make a forceful demonstration.

NEW MAP OF VIRGINIA

SHOWS POWER STATIONS AND TRANSMISSION LINES OF PUBLIC SERVICE COMPANIES

A new map of Virginia on a scale of 1:500,000, showing the location of the power stations and transmission lines used in public service and the names of the public-utility companies has just been published by the United States Geological Survey, Department of the Interior.

This map is one of the series of State power maps now being published by the Geological Survey. Maps have already been completed of New York, Pennsylvania, Massachusetts, Rhode Island, Connecticut, Maryland, Delaware, District of Columbia, Vermont, New Hampshire, and New Jersey, and maps of Indiana, Maine, and West Virginia are being prepared for publication. The maps that are available for distribution may be purchased from the Director of the United States Geological Survey for 50 cents a copy.

These maps will be valuable to those who are interested in the inter-connection of power plants, to those who wish to establish manufacturing plants within reach of electrical power, to municipalities contemplating the use of electricity for light and power, and to municipalities considering the feasibility of purchasing electricity instead of reconstructing an old or obsolete municipal plant. The Geological Survey recently made a special investigation of the possible economy of fuel, labor, and materials resulting from the use in the Boston-Washington industrial region of a comprehensive system for the generation and distribution of electricity to transportation lines and industries. The report of this investigation was published as Professional Paper 123. *A Superpower System for the Region between Boston and Washington.* This investigation showed conclusively that plants of 500-horsepower or less can economically purchase energy instead of generating it, as it was found that small plants consumed from 6.23 pounds of coal per kilowatt-hour, while the large plants consumed but 2.14 pounds per kilowatt-hour. The variation in the cost of maintenance, labor, and supplies was even more marked, the ratio being about 4:1 against the small plants.
