

SHORTER CONTRIBUTION

A new procedure for producing glass bubbling tips

By CHARLES W. MILLER¹ and WAYNE V. KESSLER, *Bionucleonics Department, Purdue University, West Lafayette, Indiana 47907 USA*

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Recently several studies have been reported concerning the transfer of materials from a body of water into the atmosphere by the process of bursting bubbles. Some of the materials that were found to be transferred by this process include phosphates (MacIntyre & Winchester, 1969), nitrogen (Wilson, 1959), bacteria (Blanchard & Syzdek, 1970 and 1972), pollen (Valencia, 1967), certain metals (Ericksson, 1957), and sulfates (Miller, 1973). It will be noted that many of these substances play a role in the atmospheric pollution problem of today.

Laboratory studies of this transfer process usually involve the production of bubbles in a water solution of the material being considered by passing air through a glass tip immersed in the solution. When many bubbles of varying sizes are desired at one time, an ordinary fritted glass gas dispersion tube may be used for the bubbling tip (Wilkniss & Bressan, 1971). There are times, however, when it is desired that bubbles of a known size be produced one at a time on demand (Blanchard, 1963; Blanchard & Syzdek, 1970 and 1972). In this situation, bubbling tips are usually prepared by drawing glass tubing out to a very fine point and then cutting the tubing off until the desired diameter is obtained. This drawing process is usually done by hand, and it can be both tedious and time consuming before a tip of the proper size is obtained (Blanchard, 1963).

Neurobiologists use filled glass needles as electrodes for studying electrical phenomena inside living systems. These glass needles are

produced from ordinary round tubing using glass needle pullers. The tips of these needles are very fine so that microscopic systems can be studied with them. They are also very uniform in size for a given size of glass tubing and instrument setting.

It has been found that tips produced by these glass needle pullers can be used in bubbling studies in place of hand drawn tips. Capillary tubing up to 0.64 cm o.d. was drawn out to a tip on one instrument (Narishige Scientific Instrument Laboratory, Tokyo, Japan), while disposable micro-pipettes (Microcaps, Drummond Scientific Co., 500 Parkway, Broomall, PA 19008) were drawn out using a different instrument (Industrial Science Associates, Inc., Ridgewood, NY 11227). A final inside diameter of a few μm is obtained by this method, with larger diameters obtained by simply cutting the tip back. Tips with lengths of up to 8 cm can be easily obtained. The larger outside diameter tubes can be attached to the bubbling gas supply system using tygon tubing, while the disposable micro-pipettes can be attached using heat-shrinkable tubing. Results of bubbling with these quickly and easily made tips indicate that bubbles of most any desired size and that appear to be uniform for a given tip can be produced from them.

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¹ Present address: Physics Department, Anderson College, Anderson, IN 46011.

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