cloth openings. The departure at high flows is caused partially by the high velocity through the cloth and very slightly by the resistance loss of the tubing and the elbow loss at connection F. The amount of departure from linearity at zero mercury level is small, thus indicating that the tubing and orifice loss are negligible. The size of the apparatus can be changed to other dimensions for other purposes. If the tubing diameter is decreased the departure from linearity will occur at lower air flows.

One disadvantage to the use of the apparatus for inspiration is the presence of mercury for an area-adjusting medium. During expiration, of course, there is no significant mercury exposure. Measurements of the mercury vapor concentration were made with the General Electric mercury vapor detector.[8] Air was drawn through the tube at a rate of 25 liters per minute and readings were taken at several positions of the mercury level. The mean concentration indicated was 6 milligrams per 10 cubic meters of air. This value is six times the permissible exposure for an occupational exposure. The time of exposure in our experiments is less than one hour, whereas the threshold value of 1 milligram per 10 cubic meters is based on a daily exposure.[9] On this basis, therefore, the amount of mercury absorbed in one hour's exposure is less than the permissible daily absorption.

SUMMARY

A simple easily adjustable linear response resistance apparatus is described. The resistance unit contains a glass filter cloth, the effective area of which is adjusted by a mercury column.

The resistance of the unit can be adjusted from 0.1 to 1.0 millimeters of water per liter of air flow per minute. The resistance can be easily increased or decreased during the progress of an experiment. The mercury hazard during inspiration was evaluated and not found significant for experiments of one hour.

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THE DETECTION OF PENICILLINASE-PRODUCING PROPERTIES OF MICRO-ORGANISMS

IN quest of active penicillinase-producing organisms a simple method for the rapid determination of the ability of organisms to produce this penicillin-inactivating enzyme was evolved. Most previously used methods involve the assay of a penicillin solution before and after exposure to the inactivating substance.

This method is based on the ability of penicillinase to diffuse from the organism in question into a penicillin agar medium previously inoculated with a penicillin sensitive organism. The penicillin added to the medium is sufficient to inhibit the seeded sensitive organism so that no growth occurs. If a penicillinase-producing organism is streaked onto the surface of this medium, penicillinase is elaborated in its growth which diffuses into the agar, inactivates the penicillin and thus permits the seeded sensitive organism to grow out. The growth occurs as a stippled zone of satellite colonies around the streak. Details of the method are as follows:

To 10 cc of melted tryptose-phosphate agar at 45° C., 0.1 cc of a 24-hour broth culture of a sensitive *Staphylococcus aureus* (the strain used was sensitive to 0.04 units of penicillin per cc) is added. Penicillin solution is then added to give final concentrations of 0.5 units per cc. Plates are poured and allowed to harden at room temperature. A minimum of surface moisture is necessary. The organism under study is then introduced by a single streak. Several organisms may be tested simultaneously on the same plate provided sufficient space is allowed for ascertaining the zone of inactivation. Best results have been obtained by making the streaks from the center outward like the spokes of a wheel. The plates are incubated at 37° C. for 24 to 48 hours and inspected for satellite Staphylococcus colonies. If the streaked organism does not produce penicillinase, satellite Staphylococcus colonies are not observed. If the streaked organism produces sufficient penicillinase, satellite colonies of Staphylococcus occur around the line of the streaked organism. The width of the zone of satellite colonies will vary, depending on the amount of penicillinase produced and the concentration of the penicillin in the agar.

Rough quantitative determinations of the amount of penicillinase produced can be made by measuring the width of the zone of satellite growth. More accurate quantitative studies can be made by using a series of plates with varying penicillin concentrations.

This method can also be used for the primary isolation of penicillinase producing organisms. Poured or streaked plates of the sample containing the organisms are made with the seeded penicillin agar medium. Only those colonies that grow readily and produce a zone of satellite Staphylococcus colonies need be picked for further study.

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[8] T. T. Woodson, *Rev. Sci. Instruments*, 10: 308–311, 1939.

[9] American Standard: Allowable concentration of mercury. 37.8—1943. American Standards Association, New York. Approved January 6, 1943.