

A Modified Cuvette Densitometer

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The calculation of cardiac output by the indicator dilution technique requires a knowledge of the way in which the arterial concentration of an indicator varies with time. This is usually determined by withdrawing arterial blood at constant rate through a suitable sensing device designed to produce an electrical signal which is, at any instant, proportional to the indicator concentration in the blood. A commonly used indicator is the dye indocyanine green, the arterial concentration of which may conveniently be measured with a photoelectric cuvette densitometer such as that manufactured by the Waters Co., Rochester, Minnesota. While the accuracy and linearity

of this instrument are entirely satisfactory, the cuvette does have the disadvantage in clinical use that it can only be sterilized by chemical means, the efficiency and safety of which may at times be open to doubt.

This communication describes a modified cuvette lumen (fig. 1, bottom) which can be substituted for that in the original instrument (fig. 1, top), but which may be sterilized by autoclaving, or other suitable method. It consists of two parts, a) a machined Ebonite disc, which is not sterilized, and b) a length of clear nylon tubing (outside diameter 2.76 mm., inside diameter 1.90 mm., Portland Plastics Ltd., Hythe, Kent), which is sterilized in the autoclave. Connections are made to this nylon lumen with suitable Luer connectors (fig. 1). When this is used with the XC 301 densitometer, the disc remains permanently inside the metal cuvette housing, and the nylon tubing is threaded through after sterilization; whereas with the later model of this densitometer (XC

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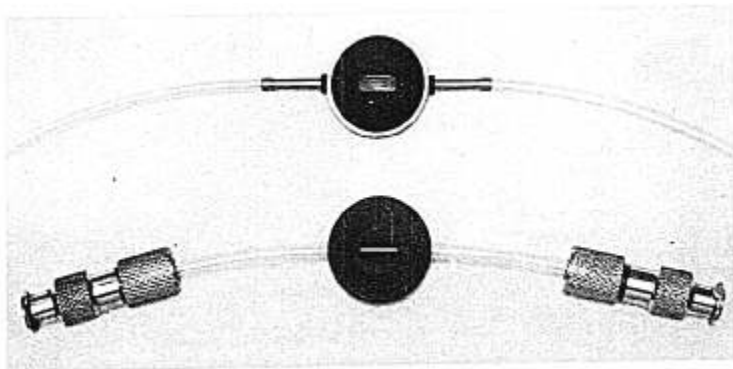


FIG. 1.

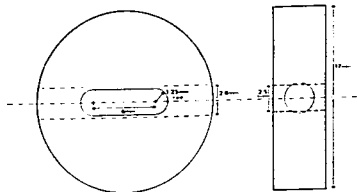


FIG. 2.

302) the disc is removable and may be fitted with the nylon tube outside the housing.

The sensitivity, linearity, and speed of response of the cuvette densitometer with the modified lumen are not significantly different from those obtained using the original lumen. The machining of the Ebonite disc takes less than 1 hour and needs only standard workshop tools and techniques. A working drawing is shown in figure 2.

A Convenient and Accurate Nebulizer

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Many suggestions and types of apparatus have been proposed for nebulizing drugs such as bronchodilators during anesthesia and positive pressure breathing.¹⁻⁵ A serious problem with use of all of these nebulizers is that incorrect dosage occurs frequently. In addition, attachment of the nebulizer to inhalation equipment is often inconvenient. Need for a hand bulb or separate source of gas for nebulization and the necessity for keeping the nebulizer horizontal also present significant problems when the common jet orifice type of apparatus is used. Since bronchodilatation following the administration of intravenous agents may be less predictable than after the direct inhalation route,⁶ a convenient and inexpensive technique for nebulizing bronchodilator drugs is described.

Recently, pressurized, valved cartridges containing aerosol suspended drugs have become available and provide accurate dose delivery with each valve depression. The cartridge of isoproterenol** fits into a casing which is particularly suitable for anesthesia and inhalation therapy apparatus. It contains a fine particle suspension of 2.0 mg./ml. isoproterenol sulfate

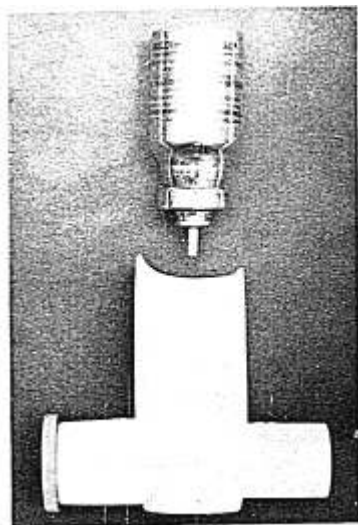


FIG. 1. Pressurized cartridge containing isoproterenol and casing with 15 mm. adapter.

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** Medihaler-Iso.

(USP) in an inert propellant. An exact amount of 0.075 mg. is delivered with each valve depression. The drug is micronized so that the