Technical methods

flask positioned to receive the effluent.

Since the basic component glassware is readily available and inexpensive, repair and replacement costs and time lost in experimentation have been minimized. These facts should permit anyone with a moderate budget to use a similar apparatus.

As in the use of all semi-continuous or continuous culture devices, caution must be exercised in order to avoid contamination. However, if the principles governing sterile technique are observed, contamination does not pose a problem, because the entire system is essentially closed except during the short (one- to two-minute) sampling period.

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An adjustable, semi-automatic dispenser for use with dry absorbents in protein-binding techniques

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The assay of steroid hormone levels in plasma often requires the addition of precise amounts of a dry absorbent, such as florisol, to separate the free from the protein-bound components. To achieve this various dispensers have been constructed and described, ranging in complexity from the simple calibrated spoon described by Murphy (1967) to the more elaborate semi-automatic dispenser described by Castro, Klein, and Cryderman (1970). Modification of the dispenser described by Bayard, Beitins, Kowarski, and Migeon (1970) has resulted in a semi-automatic dispenser which is robust, has a high degree of precision, is of simple construction, and has the further advantage of being adjustable to deliver various amounts of the dried material.

Construction

The dispenser was made from a 250 ml separating flask fitted with a teflon stopcock. The stopcock was removed and its existing channel widened to 6 mm. At one end the channel was widened to a diameter of 10 mm to form a recess which was 2.5 mm deep. Using 10 mm diameter teflon rod a plug was made as shown in Figure 1. The diameter of the shaft was 6 mm, the head 10 mm in diameter and 3 mm thick. The plug was inserted into the stopcock and pushed home. The head of the plug was then shaped to match the contour of the stopcock. A punch mark was placed on the stopcock and the plug to allow correct alignment of the plug for subsequent insertions.

Using a scalpel blade the shaft of the plug can be reduced in length until the desired amount of absorbent is delivered (a shaft length of 7 mm delivered about 40 mg of florisol). With this technique plugs have been made which, when inserted into the stopcock, will deliver approximately 40 mg, 60 mg, and 90 mg of florisol. One of the side arms of the

Fig. 1 Modified stopcock with plugs.

stopcock was removed, as shown in Fig. 1 so that the one remaining could be used to indicate the filling and emptying positions of the dispenser, as well as to turn the stopcock in the barrel.

ensure complete delivery. By turning the stopcock with the right hand visual examination of the absorbent can be made before delivery to ensure that the dispensing well is completely filled.

Results

To measure the precision of our dispenser 25 weighings were made at each of the three levels dispensed. The plugs were removed and interchanged in a random fashion and a further 10 weighings were made at each level as a check on the reproducibility of the dispenser. This procedure was carried out twice and the results obtained are shown in Table I.

Comments

The performance of the solid phase dispenser described has compared very favourably with the findings of Murphy (1967) who obtained a precision of 39.3 ± 1.3 mg (range 37.0 to 41.4) for 10 observations using a calibrated spoon. Castro, Klein, and Cryderman (1970), using a semi-automatic dispenser for 25 deliveries, obtained a range of 74.1 to 75.9 mg (75.0 ± 0.09 mg SD). With this dispenser it is possible to add absorbent quickly and precisely to large numbers of tubes, overcoming the problem of the loss of precision which tends to occur with repetitive measuring procedure.

	'40 mg' Plug			'60 mg' Plug			'90 mg' Plug		
	1	2	3	1	2	3	1	2	3
X (mg)	44.2	44.5	44.6	66.0	63.8	66.3	93.7	91.3	93.1
SD (mg)	1.1	0.9	0.6	1.1	0.8	1.1	1.2	0.7	0.8
CV (%)	2.6	1.9	1.4	1.7	1.3	1.7	1.3	0.8	0.9
Number of observations	25	10	10	25	10	10	25	10	10

Table I Precision of dispenser delivery

Operation

To fill the dispenser the stopcock is turned until the side arm is in the upper position. By turning the stopcock continually through 180° the dispenser will automatically fill and dispense the required amount of absorbent material. When delivering absorbent to a tube the stopcock is tapped gently to

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