Technical methods

A device for stoppering bottles and ampoules under vacuum or dry nitrogen conditions

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A recent examination of several commercial stoppering devices that drive home fluted stoppers in vacuum evacuated ampoules revealed that the cheapest device available in the USA cost \$340 and was capable of stoppering only one bottle or ampoule at a time. There followed an attempt to develop such a device from materials in this laboratory, using a commercial pressure cooker. The resulting product was inexpensive and effective.

The accompanying diagram helps to explain the device. A push rod, C, attaches to a pressure plate, K, which engages fluted rubber stoppers in the ampoules or bottles and exerts pressure on them. A sleeve to hold the push rod in alignment is shown as E. To prevent loss of vacuum, a groove was turned on the inside of the sleeve to accommodate an O-ring seal, D. This has to be of rather crucial diameter, and a seal similar to the one at F may prove superior for both ends of the alignment sleeve. The sleeve is sealed to the lid of the vacuum chamber, G, by the O-ring seal at F, and the whole thing is brought into pressure contact by a nut, J.

The seal, H, that originally came with the pressure cooker, unfortunately was not designed for vacuum, so a spring steel rod, I, was constructed to exert outward pressure on the commercially available gasket. Another alternative would be to lathe a small groove for an O-ring seal in the vacuum chamber, N. The plate M was designed so that all the ampoules and stoppers could stand flat. (The bottom of the pressure cooker is rounded at the edges, causing ampoules to tilt.) The vacuum chamber was fitted with an outlet, O, which is a threaded flange device with a nut, Q, to bring pressure on the O-ring seal, P, between the flange outlet and the vacuum chamber.

Ampoules are placed in the vacuum chamber with the slotted part of the stoppers in place. These am-

- A Pressure knob 3.8 cm diameter
- B Set screw 1.8 cm high, 0.3 cm diameter hole
- C Push rod 1.2 cm diameter tube
- D O-ring seal
- E Alignment sleeve
- F O-ring seal
- G Lid
- H Gasket 24.5 cm diameter, 21.8 cm diameter opening, 0.3 cm V-shaped recess
- I Steel spring rod 22.4 cm diameter
- J Nut 1.2 cm diameter
- K Pressure plate 19.2 cm diameter
- L Screw
- M Base plate 19.9 cm diameter
- N Vacuum chamber 20.5 cm diameter, 11.6 cm deep
- O Vacuum outlet 0.6 cm opening, 2.5 cm long
- P O-ring seal 0.8 cm diameter
- Q Nut 1.2 cm diameter, 0.6 cm opening
- R Steel lever 1.8 cm diameter, 15.5 cm hooked arm, 40.7 cm straight arm

poules contain specimens which have been previously lyophilized and flooded with dry nitrogen. If they are to be sealed under vacuum, that vacuum is

applied at outlet O after the device is assembled. Vacuum grease is required on both sides of the gasket at H. When the required vacuum is obtained, pressure is applied to the depression head of knob A which is attached to the push rod by set screw B. If numerous vials are being capped at the same time, a steel lever for exertion of pressure on the push rod is necessary; this is depicted as R. The hook portion of the lever is placed beneath the lip of lid G, and pressure is exerted on knob A with the lever arm.

If it is desirable to seal the vials under dry nitrogen, the nitrogen is added via Y-tubing channelled through the vacuum system from beyond outlet O. A second Y can be placed on the line with a short section of tubing collapsed under vacuum. When the nitrogen reaches the pressure necessary to fill the chamber completely, the collapsed section of tubing expands, the nitrogen is cut off, and the stoppers are driven home as previously described. The stoppered containers are then removed and sealed with aluminium seals under a firm press capper.

A combined moist chamber and tray

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In the FTA (abs) test sera are allowed to act on antigen-coated microscope slides¹. Small volumes of fluid are used. After incubation at 36 to 37°C in a moist chamber the slides are washed in several changes of buffered water, dried, conjugate is added, and the slides are reincubated. They are washed again in several changes of buffered water, dried, and mounted. This procedure involves repeated handling of the slides.

The apparatus has been designed to obviate handling and to facilitate the bulk transfer of slides throughout the test.

Design and Use of Apparatus

SPECIFICATION

The apparatus is in the form of a tray which is made from anodized aluminium²: length $8\frac{1}{8}$ in, width $4\frac{1}{8}$ in, depth $\frac{1}{2}$ in. Two inches from side B a $\frac{3}{4}$ in wide piece is cut out (E) rounded at both ends for neatness, and terminating $\frac{1}{4}$ in at each end, to allow the slides to be removed easily. Along side A are fixed two strips of absorbent material (C), and a strip of plastic (D) which serves to provide a watertight seal and separates the absorbent material from the slides. A handle of convenient size, but less than the width of the tray, is bolted to side A, and four holes $\frac{1}{8}$ in diameter are drilled, two centrally placed and one in

¹PTFE coated microscope slides C. A. Hendley & Company, Victoria Road, Buckhurst Hill, Essex.

²Blank tray kindly supplied by Denley Instruments Ltd, Bolney Sussex.

Received for publication 14 December 1972.