Table 1		
'Formvar' solution	Glycerol	Maximum hole diameter (μ)
8 parts	1 part	25
16 "	1 "	14
32 "	1 "	7
120 "	1 "	4

manner for films cast on glass and finally coated with carbon. Steaming of the cast film before it is dry will result in the formation of a multilayer meshwork which will contain many pseudo-holes.

The glycerol content controls the number of holes and also their size (Table 1), and therefore permits films to be made best suited to the particular requirement. Films made by this method are stable in the electron beam and sufficiently robust to permit such operations as the staining and washing of biological specimens.

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¹ Kay, D., *Techniques for Electron Microscopy* (Blackwell, Oxford, 1961).

Storage of Standardized Radioactive Solutions

A RECENT communication, Hamilton¹, directed attention to changes in concentration of standardized solutions stored in polythene bottles caused by transpiration. The conclusion was drawn that 'Pyrex' or quartz containers were necessary for the storage of such solutions to prevent loss of water.

Radioactive solutions were originally stored here in glass vials, but these have been replaced by polythene ampoules of 6 ml. or 40 ml. capacity². Less adsorption of inorganic material from solution occurs in polythene and the ampoules, being unbreakable, are safer to handle. If the neck of the ampoule is drawn into a fine capillary, solutions may be easily drawn into or expelled from the container. The ampoule is perfectly sealed by melting gently the tip of the capillary and closing it by pressing with a pair of tweezers. Permanent labelling of polythene is easily accomplished with a hot wire.

The results of a series of international intercomparisons on radioactive counting techniques indicated that specific activity of solutions was increasing with time. This increase was attributed to transpiration from the polythene ampoules in which the solutions were transported. To test this theory several ampoules containing various quantities of water or dilute nitric acid were sealed and stored open to the atmosphere, but shielded from draughts. Monthly weighings over a period of one year showed that a fairly regular loss in weight occurred in the ampoules (Fig. 1). As one would expect, the loss varied with the wall thickness and surface area of the ampoules, but was independent of the volume of solution. This means that the concentration of the solution increases faster in ampoules containing smaller amounts of solution. Rates of change of up to 8 per cent per annum have been observed.

Rather than lose the advantages of polythene by reverting to glass vials the transpiration was reduced to acceptable levels by storing the ampoules in an enclosed space over water. A desiccator in which the desiccant is replaced by water makes an ideal store. Results already obtained (dashed lines in Fig. 1) show that no appreciable loss of weight occurs. As it

Fig. 1. Change in weight of polythene ampoules during storage. Total percentage change is given at the end of each storage period. O, stored open to atmosphere; x, stored over water.

might be argued that constancy of weight does not necessarily imply constancy of concentration, a direct experiment is also being carried out on cobalt-60 solutions.

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¹ Hamilton, E., *Nature*, **193**, 200 (1962).

² Herrington, J., and Vallis, D. G., *Chem. and Indust.*, 808 (1957).

THE volume of standard solutions used in isotopic geological age investigations range from 100 to 1,000 ml., the latter being the most common. Keith's conclusions seem admirable for small volumes of solution. In my previous work similar experiments were carried out, but were discontinued for the following reasons:

(a) Preliminary experiments using radioactive traces indicated that over long periods of time the polythene walls of the bottles acted as a semi-permeable membrane. As the standards were stored in acid solution the use of an enclosed volume of water-vapour to reduce transpiration seemed inadvisable.

(b) The use of water in an enclosed space may require temperature control to prevent condensation of water vapour on the polythene and its adsorption into the outer walls of the polythene bottles, thus forming conditions suitable for osmotic transfer.

If the migration of acid out through the polythene walls is impossible then it is possible to flame spray the polythene with an impervious layer of zinc metal (private communication from Imperial Chemical Industries, Ltd.), or some other material. In this laboratory quartz bottles with ground stoppers are now used and variations of standard concentrates are being observed.

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