

AN ELECTROLYTICAL BRIDGE FOR THE INVESTIGATION OF ELECTROOSMOSIS UNDER HYDROSTATIC PRESSURE

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Glass siphons filled with agar-agar gel prepared in a KCl solution are not applicable as electrolytic bridges at higher pressures, as in this case, the gel is easily forced out of the siphon. The use of polished surfaces, which is usually applied in potentiometric measurements is not permissible if a current of the order of several tens of milliamperes passes through the electrodes because of the large and unstable resistance of solution layers wetting the polished surface.

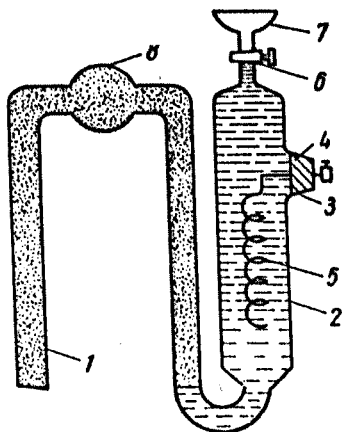


Diagram of the electrolytic bridge.

The figure shows an electrolytic bridge which is able to withstand a considerable pressure drop when a current of the order of 40 ma passes through it at the same time. The agar-agar gel is brought into contact with a solution of copper sulfate and the pressure which the working chamber exerts on the gel is transmitted to the liquid contained in the closed vessel. The glass siphon 1 is connected to vessel 2 which has a conical outlet 3. A copper helix 5, serving as an electrode, passes through a rubber plug 4 which is placed in the outlet from the inside of the vessel. After the electrode is placed inside, a valve 6 with funnel 7, through which the saturated solution of copper sulfate is poured into the vessel, is fastened to the upper end of the vessel. The adhesion of agar-gel to the siphon walls is facilitated by the spherical bulb 8.

When the siphon is filled with a 3%-sol of agar, prepared in a KCl solution (by the usual method of preparation), it is recommended that this siphon be immersed in hot water in the reverse position so that the free end, where the sol is poured, remains above the water level. Here, vessel 2 must remain in air and valve 6 must be open. After agar gelatinizes, vessel 2 is filled so that air bubbles are eliminated, and the valve 6 is closed. The free end of siphon 1 is connected by a rubber hose to the working chamber.

The maximum pressure which the bridge can withstand is determined by the strength of glass. The proposed electrolytic bridge has been applied in the investigation of filtering processes in porous systems under hydrostatic pressure when an electric current was simultaneously applied, and it gave excellent results. The bridge can be also applied for work in vacuum. In this case, outlet 3 should be reversed in such a way that the plug 4 is placed in vessel 2 from the outside.

A DEVICE FOR SAMPLING SLAG ASSAYS

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We have developed a device for sampling slag assays, permitting the investigation of the composition and structure of the covering slag layer continuously throughout its entire depth, including the composition of layers which are in direct contact with gas and metal phases.

A device which is shown in the figure consists of a detachable steel bucket 1 with an automatically closing bottom 2.