

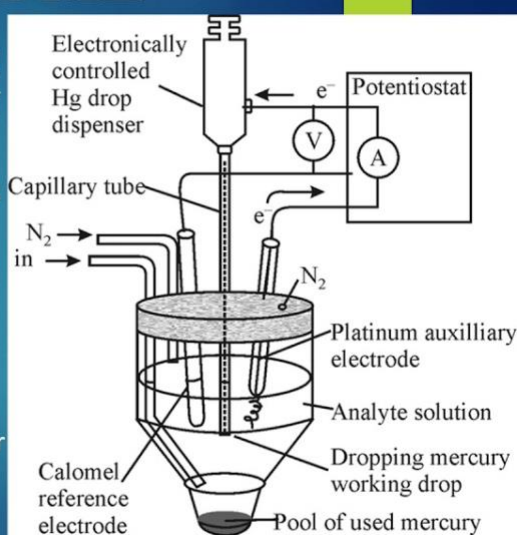
## DME( Dropping mercury electrode)

The **dropping mercury electrode (DME)** is a working electrode made of mercury and used in polarography. It is a polarisable micro-electrodes in which the drop of mercury trickles down from a resistance-glass capillary (0.05-0.08 mm in diameter and 5-9cm long) . The dropping mercury electrode has the following advantages

- Its surface is reproducible, smooth, and continuously renewed; the current potential curve is reproducible and eliminates passivity or poisoning effects.
- The diffusion current assumes a steady value immediately after each change of applied potential, and is reproducible.
- The large hydrogen over potential on mercury allows possible the deposition of substances difficult to reduce, e.g. the alkali metal ions, aluminium ion and manganese(II) ion.
- The surface area can be calculated from the weight of the drops.
  - The dropping mercury electrode is generally applied over the range +0.4 to about - 2.0 volts with reference to the S.C.E. Above +0.4 volt mercury dissolves and gives an anodic wave; it begins to oxidise to mercury(I) ion.
  - At potentials more negative than about - 1.8 volts with reference to the S.C.E. , visible hydrogen evolution occurs in acid solutions and the usual supporting electrolytes commence to discharge.
  - The range may be extended to about - 2.6 volts by using supporting electrolytes having higher reduction potentials than the alkali metals; tetra-alkyl ammonium hydroxides or their salts are satisfactory for this purpose.

## WORKING OF DME

- ▶ Mercury drops form at the end of a capillary delivery tube, grow with time to a certain size, and then fall off. Typical drop lifetime is on the order of 5 seconds
- ▶ Electrochemistry is done on the mercury drop (e.g. amalgam formation) and the electrode is regenerated following the loss of the each droplet
- ▶ Increasing potential is applied as a linear function with respect to time between the DME and an auxiliary electrode
- ▶ Scan time is usually on the order of ten minutes for a typical voltage ramp ranging from 0 – 2000Mv
- ▶ Actual potential of the DME is measured using a reference electrode, typically a SCE



A POLAROGRAPHIC CELL

