EXPERIMENTAL DETERMINATION OF THE SPECIFIC LATENT HEAT OF VAPORIZATION OF A LIQUID

The method about to be described is a continuous flow method and makes use of a self-jacketing vaporizer.

The liquid under investigation is heated to boiling point and the vapour which is produced passes to the condenser by way of holes (H) in the inner wall of the vessel. Boiling is continued, and eventually the temperatures of all parts of the apparatus become steady. At this stage the condensed vapour is collected, over a measured time *t,* and its mass *ml* determined. If VI and I are the heater PD and current respectively, then the electrical energy supplied in time *t* is VIt. Since the temperatures are steady, this energy is used only to vaporize the liquid and to offset heat losses, and therefore

$$VIt = mL + Q$$

where L is the specific latent heat of vaporization of the liquid and *Q* is the heat lost to the surroundings in time t .
The heater PD and current are now changed to V_2 and I_2 and the new mass m_2 of vapour which condenses in the same time *t* is measured.

Each part of the apparatus is at the same temperature as it was with the initial rate of heating and the energy lost in time *t* is again *Q.* Therefore

$$V_2 I_2 t = m_2 L + Q$$

Subtracting equations gives

$$V_2 I_2 t - VIt = (m_2 - m_1) L$$

from which L can be determined.

The liquid which is being vaporized is surrounded by its vapour (hence self-jacketing vaporiser). Any heat lost by the vapour causes it to condense, not to cool, and therefore the liquid is surrounded by a constant temperature enclosure which is at its own temperature; this considerably reduces heat losses from the liquid.