The first critical heat flux depends only on the bath temperature (cf. III-3), thereby confirming that it is a function of the density of superfluid atoms in the two-fluid model.

When the heat flux exceeds the first critical one, a temperature gradient appears in the helium filling the tube.

As the liquid temperature rises, its heat transfer capacity decreases, and it only stops heating when it has reached the boiling temperature corresponding to the pressure applied on the bath.

In such conditions, a characteristic rate stable in temperature is again reached in the heating tube through the boiling of the helium at a temperature corresponding to the applied pressure (cf. III - 2).

The two flow rates are quite distinct in experiments carried out at high pressures. However, when the over-pressure is slight, or when it is an effect of depth of immersion, as in a saturated bath, the two rates occur at temperature levels very close together, but remain even if they are difficult to distinguish.

When boiling has occured in the tube, appreciable differences in density give rise to convection movements which enable the heat flux to increase until it attains a second critical flux at which the rate of vaporisation becomes too large.

In our experiments, this second critical flux depends both on pressure and temperature (heat of vaporisation and gas density), but it is reasonable to suppose that it is greatly influenced by the experimental geometry and its effect on convection.