Vertical Surface Boiling

Boiling on a heated vertical surface is qualitatively similar to that on a horizontal surface except for the upward liquid and vapor velocities caused by natural convection. Often this results in a cooler liquid and a lower surface temperature at lower elevations and a progression through various types of boiling as the flow proceeds upwards. Figure 1 provides an illustrative example. Boiling begins near the bottom of the heated rod and the bubbles increase in size as they are convected upward. At a well-defined elevation, boiling crisis (section (Nqe)) occurs and marks the transition to film boiling at a point about 5/8 of the way up the rod in the photograph. At this point, the material of the rod or pipe experiences an abrupt and substantial rise in surface temperature as described in section (Nqe).

The nucleate boiling regime was described earlier. The film boiling regime is a little different than that described in section (Nid) and is addressed in the following section.

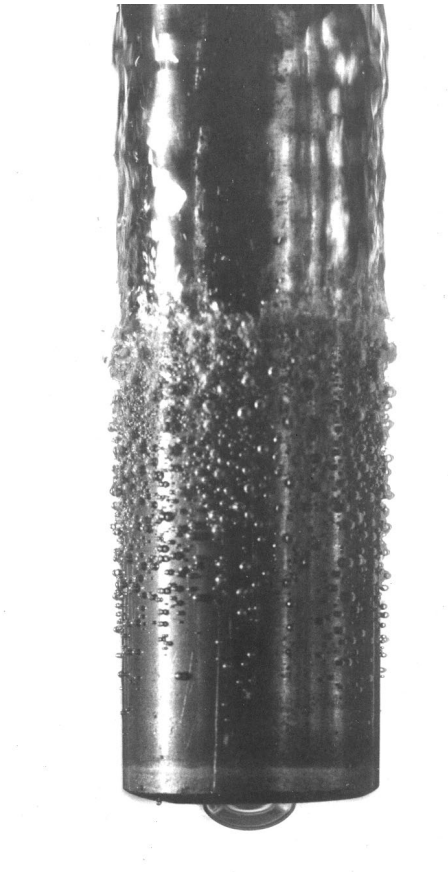

Figure 1: The evolution of convective boiling around a heated rod, reproduced from Sherman and Sabersky (1981) with permission.