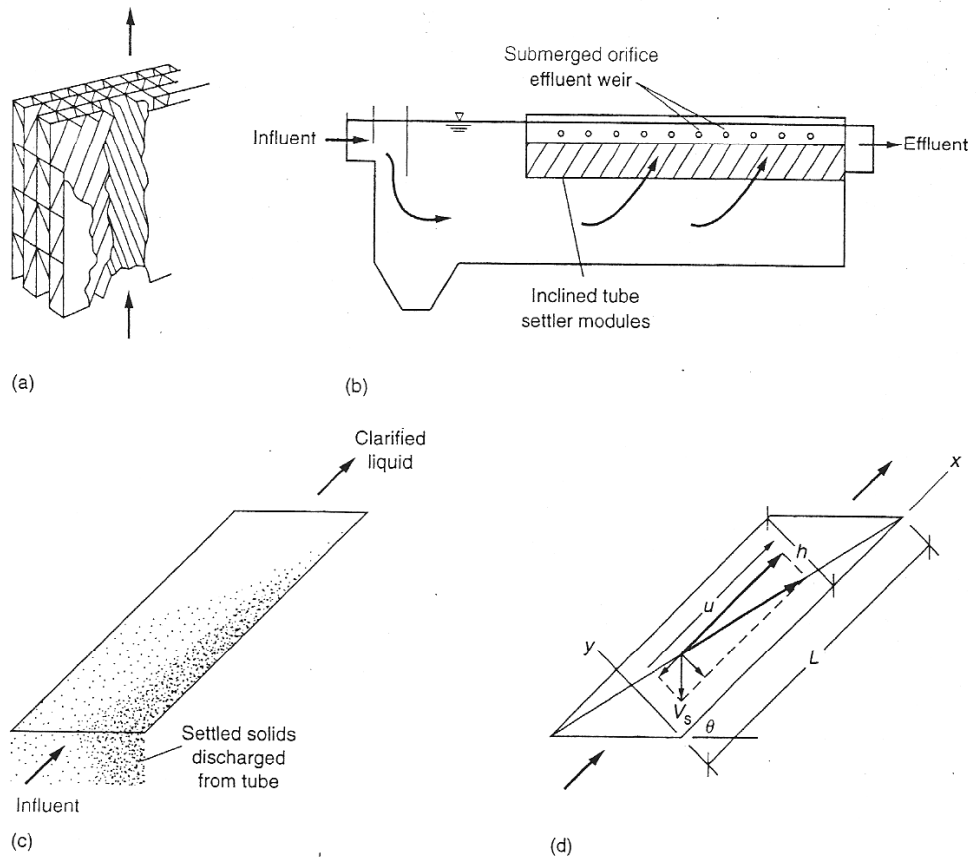


**Figure 5-25**

Plate and tube settlers:  
 (a) module of inclined tubes, (b) tubes installed in a rectangular sedimentation tank, (c) operation, and (d) definition sketch for the analysis of settling in a tube settler.



the theory that settling depends on the settling area rather than detention time. Although they are used predominantly in water-treatment applications, plate and tube settlers are used in wastewater-treatment for primary, secondary, and tertiary sedimentation. In primary sedimentation applications, however, fine screening should be provided ahead of the settling operation to prevent plugging of the plates or tubes.

To be self-cleaning, plate or tube settlers are usually set at an angle between 45 and 60° above the horizontal. When the angle is increased above 60°, the efficiency decreases. If the plates and tubes are inclined at angles less than 45°, solids will tend to accumulate within the plates or tubes. Nominal spacing between plates is 50 mm (2 in), with an inclined length of 1 to 2 m (3 to 6 ft). To control biological growths and the production of odors (the principal problems encountered with their use), the accumulated solids must be flushed out periodically (usually with a high-pressure water). The need for flushing poses a problem with the use of plate and tube settlers when the characteristics of the solids to be removed vary from day to day.

The main objective in inclined settler development has been to obtain settling efficiencies close to theoretical limits. Attention must be given to providing equal flow distribution to each settler, producing good flow distribution within each settler, and collecting settled solids while preventing resuspension.