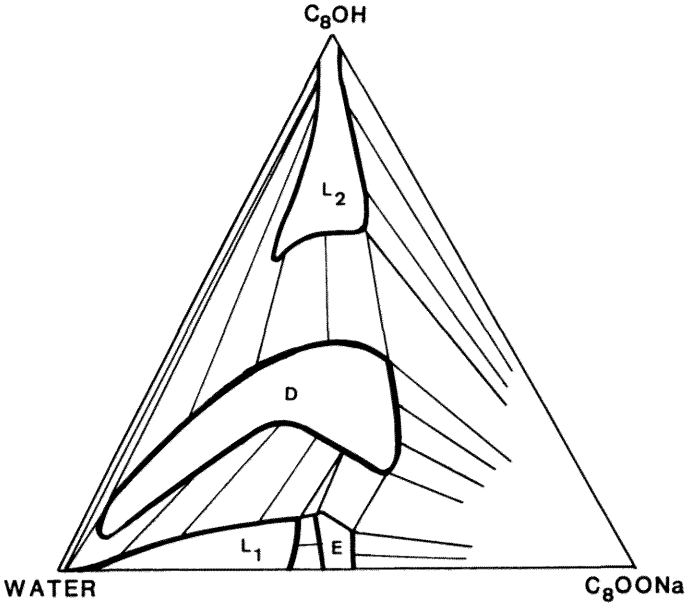

Figure 17.2 Phase diagram according to Ekwall (11) for the system water–octanol–sodium octanoate at 25°C. The single-phase regions are denoted by L_1 for the normal micellar, E for the hexagonal liquid crystal, D for the lamellar liquid crystal, and L_2 for the inverse micellar. This phase behavior is typical for a single-tail anionic surfactant in combination with a medium chain alcohol. (From Ref. 11, used with permission of Academic Press).

thoroughly characterized three-component system water–octanol–sodium caprylate shows the typical phase behavior in Figure 2 (11). At high water content, normal micelles form. As octanol is added, the lamellar liquid crystalline phase is encountered and, ultimately, at highest octanol content, the inverse micelle region occurs (see Fig. 1). This trend, which is characteristic of ionic surfactant systems with medium-chain length alcohols as cosurfactants, can be reasonably explained by packing considerations (6).

The packing ratio (PR) for these systems is defined as

$$v/(l_c a_o) = PR$$

where v and l_c are approximately the volume and the length of the hydrocarbon portion of the amphiphile, and a_o is the optimum area