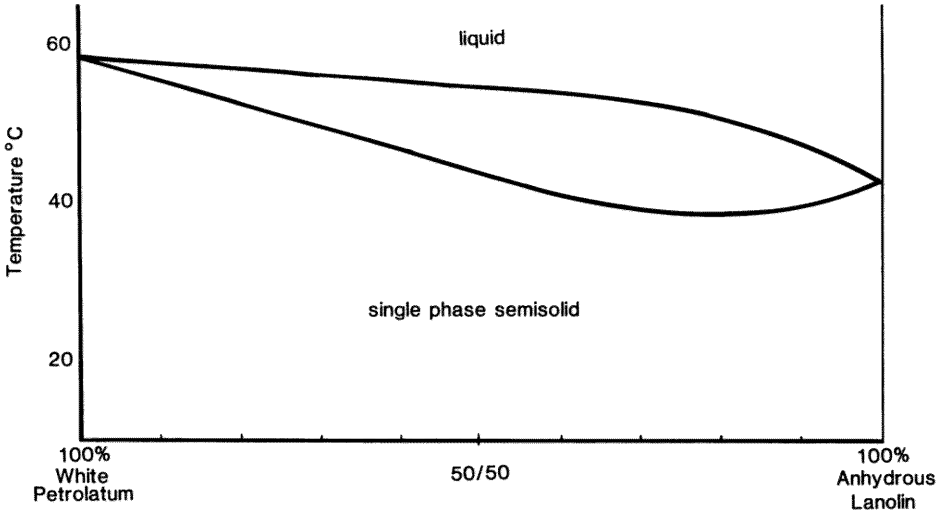

Figure 9.7 Freezing point diagram for the semisolid system white petrolatum–anhydrous lanolin. For this particular lot of lanolin, the phase behavior is similar to the idealized phase behavior for two miscible solids as shown in Figure 4.

2. *Ternary, Pseudoternary, and Quaternary Systems*

The use of ternary plots is a convenient representation of phase behavior when three or more components are involved. Because ternary plots are frequently encountered in the pharmaceutical literature (10), a description of how to fully utilize this type of diagram will follow.

The two-dimensional representation of a three-component system is possible only if the temperature and pressure are fixed. The phase behavior, as a function of composition, can then be represented on a triangular plot. The triangular plot is merely a composition grid in which any point of the triangular plot represents the relative amount of each of the three components. When the amount of each of these components is added up for any single point on the plot, the total composition will always be 100%. The geometric result is that the sum of the three perpendicular distances from any point to the three sides of the triangle is equal to the height of the triangle (i.e., 100%).

First consider the three corners of the ternary plot. These corners represent the pure component, that is, 100% of either A, B, or C. The lines connecting the 100% corners constitute the three