



Figure 9.11 Example of the utility of tie lines for determining the amount and composition of each phase in a two-phase system. The composition marked X will split into two phases upon reaching equilibrium. The composition of each phase will be the same as the composition at the phase boundary–tie line intersection (circled points), whereas the amount of each phase is proportional to the geometric distance of the phase boundary–tie line intersection points (circles) and the sample point (X).

Analogous events occur along the β - and γ -phase boundaries, resulting in the tie lines forming the triangular tie line boundary of the three-phase region.

The tie lines can be used to read both the composition of each phase and the amount of each phase. For samples that split into two phases, the composition of the separated phases will be the same as the compositions at which the tie line intersects the phase boundaries. For example, in Figure 11, the sample containing 65% A, 22% B, and 13% C is mixed. Upon standing, the sample splits into an α phase on bottom and a β phase on top, with a distinct interface between the two phases. The total composition of the sample falls on the tie line shown in Figure 11. The tie line that passes through the sample composition intersects the α phase at 79% A, 10% B, 11% C, and intersects the β phase at 60% A, 26% B, 14% C. Thus, a