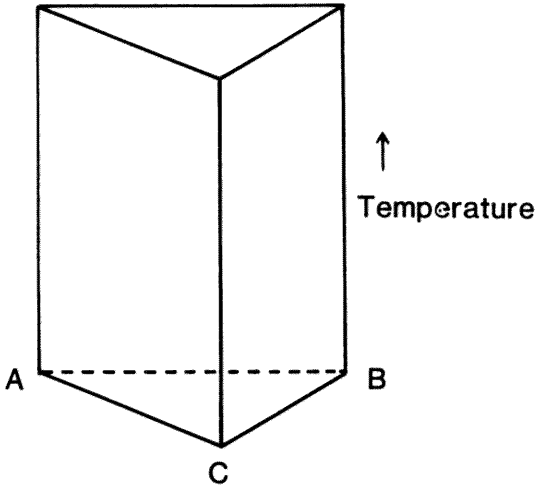

Figure 9.21 Example of a three-component phase diagram with the temperature variable as the vertical direction.

ing a triangular prism. This representation is useful when the fourth variable is temperature, or the fourth component is added to only a few percent (Fig. 21). For these triangular prism, representations for which temperature is the long axis, slices through the prism parallel to the base result in true ternary diagrams, rather than pseudoternary diagrams, whereas parallel slices through a four-component systems result in pseudoternary diagrams.

As seen, quaternary diagrams are actually "built" by constructing a series of pseudoternary diagrams. Thus, all of the concepts described earlier for ternary systems are applicable, with the minor changes that now one or more of the corners is a miscible mixture, the tie lines are no longer necessarily straight, and critical points are found on a surface rather than a curve (Fig. 22; 16).

In summary, this tutorial on binary, ternary, pseudoternary, and quaternary phase diagrams has emphasized some very important facts concerning pharmaceutical fluids and semisolid formulations. First, that homogeneous (i.e., stable) preparations exist only for a discrete set of compositional ranges, which are enclosed by a phase boundary. Preparations whose composition falls outside this phase boundary will be unstable and separate into layers of differing compositions. Within the phase boundary the product characteristics of the preparations (viscosity, drug release, appearance, consumer acceptance) should vary in a continuous and smooth manner through-