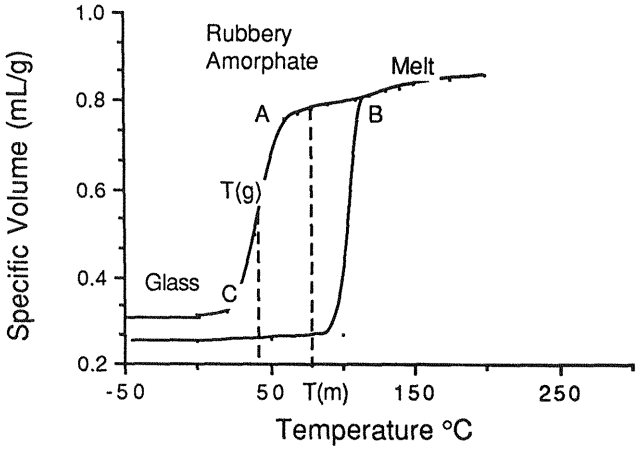

Fig. 17 Molecular volume as a function of temperature of a solid prone to forming an amorphate.

At a given high viscosity (attained at or below the melting point), the melt will have the appearance of a solid, and this is the type of material referred to as amorphous.

Right below the melting point, the molecules will have no specific orientation, and molecular movements will be random in direction and magnitude (within the limits of the system) as opposed to a crystalline material, where the molecules are arranged in lattices (ordered arrays), and where the orientation of each molecule is set.

At a temperature T_g, lower than the melting point, there will be a physical change in the amorphate. An example of this is shown in Fig. 17.

Between points A and B the properties of the amorphate are often like that of the melt. This is referred to as the "rubbery" state, and below C it is referred to as a glass.

10. WATER ABSORPTION "ISOTHERMS" INTO AMORPHATES

Amorphates are solids that are not crystalline. It is assumed at this point that the term "solid" is self-evident, although amorphates in the rubbery state (just below the melting point of the crystalline form of the compound) are actually highly viscous liquids. When exposed to humid atmospheres, they will pick up moisture in a fashion that is not like that of a BET isotherm (to be covered shortly). The moisture actually penetrates into the solid, which thus may be considered a "solution."

In an ideal situation, the water activity, a, will decrease linearly with $(1-x)$, where x is the mole fraction of solute. At a given point ($x=0.24$ in Fig. 17) the solution becomes saturated. (This concentration, of course, differs from compound to compound.) Beyond this concentration, the solution itself will be saturated, and the vapor pressure will not change with further addition of compound; rather, the composition will change, but the vapor pressure will stay constant. In this type of graph the coordinates are in the opposite direction of a usual isotherm.