

21. The change in volume of the liquid is given by  $\Delta V = \beta V \Delta T$ . If  $A$  is the cross-sectional area of the tube and  $h$  is the height of the liquid, then  $V = Ah$  is the original volume and  $\Delta V = A \Delta h$  is the change in volume. Since the tube does not change the cross-sectional area of the liquid remains the same. Therefore,  $A \Delta h = \beta Ah \Delta T$  or  $\Delta h = \beta h \Delta T$ .