

18A

● The rectangular plate shown in Figure P19.35 has an area  $A_i$  equal to  $\ell w$ . If the temperature increases by  $\Delta T$ , each dimension increases according to the equation  $\Delta L = \alpha L_i \Delta T$ , where  $\alpha$  is the average coefficient of linear expansion. Show that the increase in area is  $\Delta A = 2\alpha A_i \Delta T$ . What approximation does this expression assume?

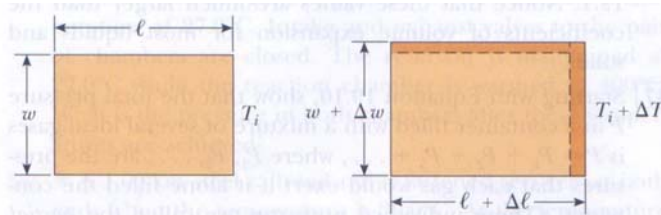


Figure P19.35

18B

A 1.00-kg block of copper at  $20.0^\circ\text{C}$  is dropped into a large vessel of liquid nitrogen at  $77.3\text{ K}$ . How many kilograms of nitrogen boil away by the time the copper reaches  $77.3\text{ K}$ ? (The specific heat of copper is  $0.0920\text{ cal/g}\cdot^\circ\text{C}$ . The latent heat of vaporization of nitrogen is  $48.0\text{ cal/g}$ .)

18C

An ideal gas initially at  $P_i$ ,  $V_i$ , and  $T_i$  is taken through a cycle as shown in Figure P20.30. (a) Find the net work done on the gas per cycle. (b) What is the net energy added by heat to the system per cycle? (c) Obtain a numerical value for the net work done per cycle for 1.00 mol of gas initially at  $0^\circ\text{C}$ .

