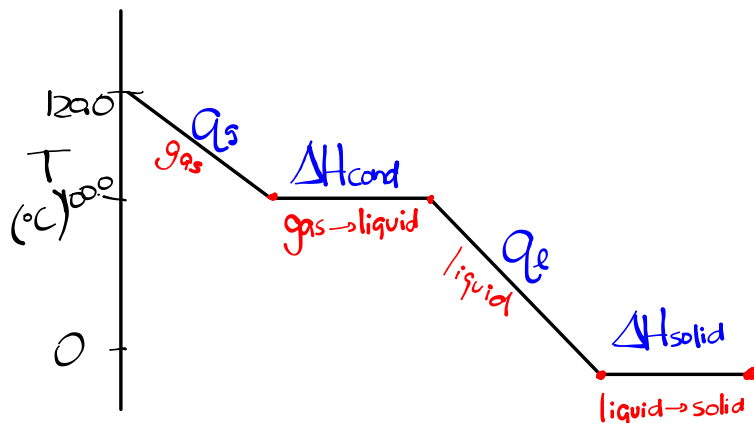


Total Energy Changes

Ex. Calculate the total energy change if 2.50 g of steam at 120.0 °C is completely converted to ice at 0.0 °C.



$$\Delta E_T = q_g + \Delta H_{\text{cond}} + q_l + \Delta H_{\text{solid}}$$

$$q_g = mC\Delta T$$

$$q_g = (2.50\text{g})\left(2.01\frac{\text{J}}{\text{g}\cdot^\circ\text{C}}\right)(-20.0^\circ\text{C})$$

$$q_g = -100.5\text{J}$$

$$\Delta H_{\text{cond}} = n\Delta H_{\text{cond}}$$

$$\Delta H_{\text{cond}} = \left(\frac{2.50\text{g}}{18.02\text{g/mol}}\right)\left(-40.8\frac{\text{kJ}}{\text{mol}}\right)$$

$$\Delta H_{\text{cond}} = -5.660\text{kJ}$$

$$q_l = mC\Delta T$$

$$q_l = (2.50\text{g})\left(4.19\frac{\text{J}}{\text{g}\cdot^\circ\text{C}}\right)(-100.0^\circ\text{C})$$

$$q_l = -1047.5\text{J}$$

$$\Delta H_{\text{solid}} = n\Delta H_{\text{solid}}$$

$$\Delta H_{\text{solid}} = \left(\frac{2.50\text{g}}{18.02\text{g/mol}}\right)\left(-6.03\frac{\text{kJ}}{\text{mol}}\right)$$

$$\Delta H_{\text{solid}} = -0.837\text{kJ}$$

$$\Delta E_T = (-0.1005\text{kJ}) + (-5.660\text{kJ}) + (-1.0475\text{kJ}) + (-0.837\text{kJ})$$

$$\Delta E_T = -7.65\text{kJ}$$

heat (q)

temp change

$$q = mC\Delta T$$

enthalpy (ΔH)

phase change



no temp change

Worksheet

