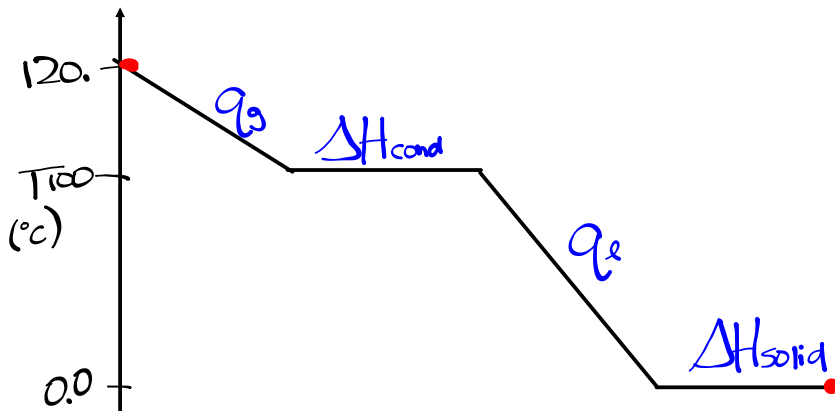


Total Energy Changes

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.



$$\Delta E_{\text{total}} = q_g + \Delta H_{\text{cond}} + q_e + \Delta H_{\text{solid}}$$

$$q_g = mC\Delta T$$

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

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

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

$$\Delta H_{\text{cond}} = \left(\frac{2.50\text{g}}{18.02\text{g/mol}}\right)\left(-408\frac{\text{kJ}}{\text{mol}}\right)$$

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

$$q_e = mC\Delta T$$

$$q_e = (2.50\text{g})(4.19\frac{\text{J}}{\text{g}\cdot\text{C}})(-100.0\text{C})$$

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

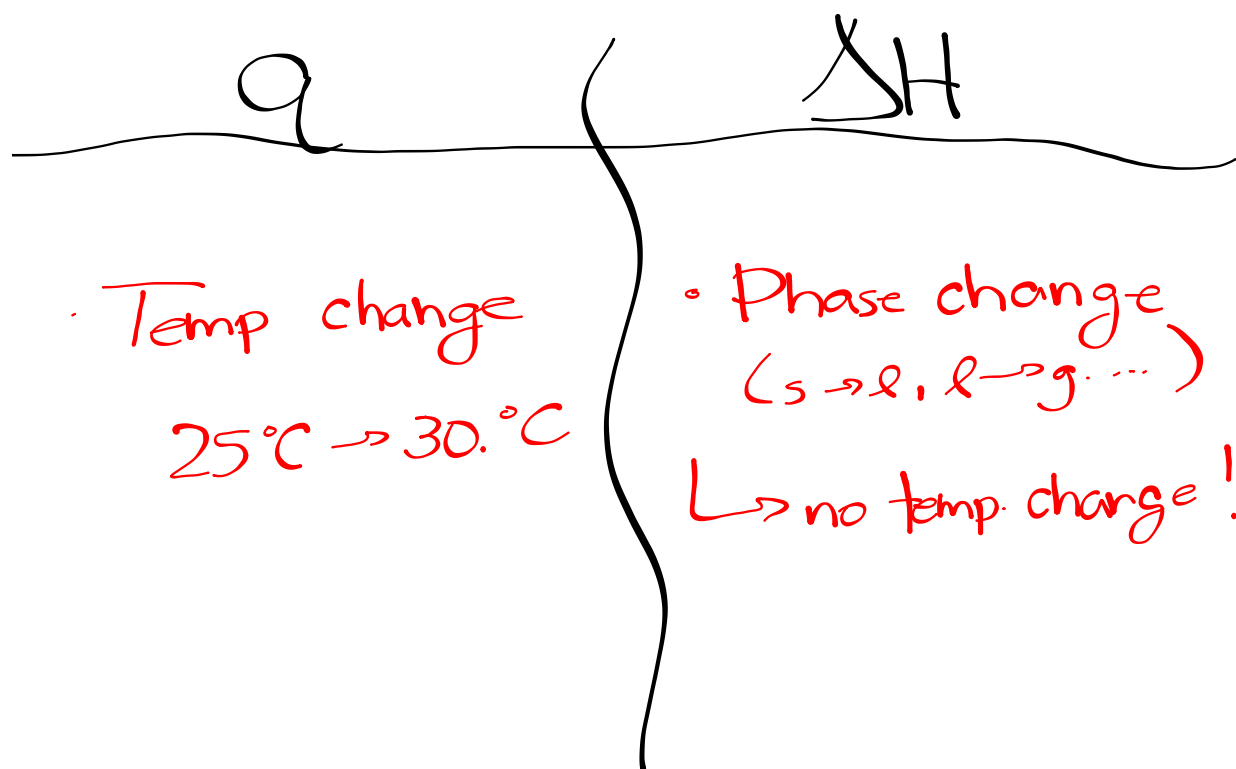
$$\Delta H_{\text{solid}} = n\Delta H_{\text{solid}}$$

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

$$\Delta H_{\text{solid}} = -0.8366\text{kJ}$$

$$\Delta E_T = (-0.1005\text{kJ}) + (-5.660\text{kJ}) + (-1.0475\text{kJ}) + (-0.8366\text{kJ})$$

$$\boxed{\Delta E_T = -7.64\text{kJ}}$$



Worksheet