

1) Calculate the total heat in joules needed to convert 22.00g of ice at -6.00 degrees celsius to liquid water at 0.500 degree celsius.

Melting point at 1 atm: 0.0 C

$$\Delta H_{\text{fus}} = 6.02 \text{ kJ/mol}$$

$$C_{\text{solid}}: 2.09 \text{ J/g} \cdot (^{\circ}\text{C})$$

$$C_{\text{liquid}}: 4.21 \text{ J/g} \cdot (^{\circ}\text{C})$$

2) How much total energy (in kJ) is required to heat the 25.0 g sample of benzene from 5.0 °C to 100.0 °C?

$$C_{\text{solid}}: 1.51 \text{ J/g} \cdot (^{\circ}\text{C})$$

$$C_{\text{liquid}}: 1.71 \text{ J/g} \cdot (^{\circ}\text{C})$$

$$C_{\text{gas}}: 1.10 \text{ J/g} \cdot (^{\circ}\text{C})$$

Melting point: 5.5°C

Boiling point: 80.1°C

$$\Delta H_{\text{fus}}: 9.87 \text{ kJ/mol}$$

$$\Delta H_{\text{vap}}: 30.8 \text{ kJ/mol}$$

3) Calculate the total energy change when 0.32mol of liquid ethanol at 25°C is converted to gaseous ethanol at 95.2°C

$$C_{\text{gas}}: 78.28 \text{ J/mol} \cdot (\text{K})$$

$$C_{\text{liquid}}: 112.4 \text{ J/mol} \cdot (\text{K})$$

Boiling point: 78.4°C

$$\Delta H_{\text{vap}}: 38.56 \text{ kJ/mol}$$

4) How much heat is released when 10.0g of steam at 125°C is cooled completely into ice at 0.0°C?

C_{liquid} : 4.184 J/g * (°C)

C_{gas} : 2.01 J/g * (°C)

Melting point: 0.0°C

Boiling point: 100.0°C

ΔH_{fus} : 6.01 kJ/mol

ΔH_{vap} : 40.7 kJ/mol

5) The vapor pressure of diethyl ether is 400.0 mmHg at 17.9 °C and 760.0 mmHg at 34.6 °C. Assuming ideal behavior, calculate the enthalpy of vaporization (ΔH_{vap}) for diethyl ether in kJ/mol.