

Thermochemistry-Calorimetry and Heat of Reaction/SS Name: _____

For complete credit show all the work for the calculations and give the answers in the correct significant figures.

Specific heat of water = $4.184 \text{ J/g}^\circ\text{C}$; density of water 1 g/mL

1) Calculate the heat capacity of a sample of radiator coolant if the temperature rises from 5 to 107°C requires 932 J . (Ans: $9.14 \text{ J/}^\circ\text{C}$)

2) How much heat in KJ is released when the temperature of

a) 47.0 g water drops from 45.4 to 10.0°C ? (Ans: -6.96 KJ)

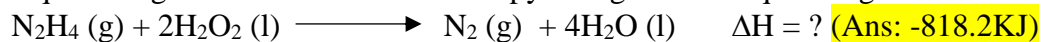
b) 209 g iron drops from 400.0 to 22.6°C ? (sp.heat iron = $0.449 \text{ J/g}^\circ\text{C}$) (Ans: -35.4 KJ)

3) To bring 36.2 g of sulfur from 25.0°C to its melting point the sulfur must absorb 2402 J of heat. What is the melting point of sulfur? (sp heat of sulfur = $0.705 \text{ J/g}^\circ\text{C}$) (Ans: 119.0°C)

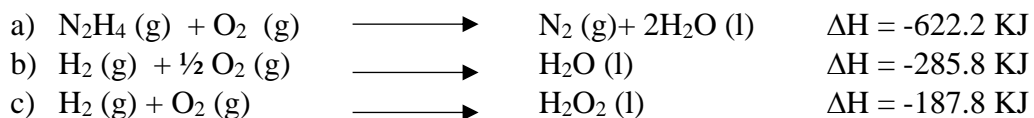
4) A 65.0 mL of 0.600 M HI at 18.46 °C is mixed with 84.0 mL of a solution containing excess of KOH at 18.46 °C in a foam cup calorimeter. The temperature rises to 21.96 °C. Calculate the ΔH (enthalpy) of the reaction. (Ans: -55.9 KJ/mol)

(Strategy: a) write the balanced equation (for mol ratio); b) calc heat absorbed by cal (use sp heat equation); c) heat absorbed by cal is heat given off during reaction (which is the reverse of answer of b, i.e. change the sign); d) calc mol of HI (it is already the limiting reagent); e) use q value from c to find ΔH (ΔH is q/mol))

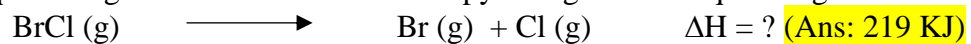
5) Use the equations given to calculate the enthalpy change for the equation given below.



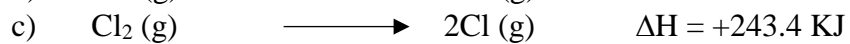
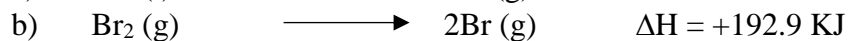
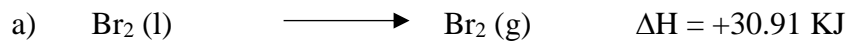
Given:



6) Use the equations given to calculate the enthalpy change for the equation given below.



Given:



7) Use the standard enthalpies of formation from the Appendix to calculate the standard enthalpy change for the following reactions.

(ΔH_f° in KJ/mol: $\text{NH}_4\text{HCO}_3 = -849.4$, $\text{NH}_3 = -46.11$, $\text{H}_2\text{O} = -285.8$; $\text{CO}_2 = 393.5$, $\text{Fe}_2\text{O}_3 = -824.2$, $\text{SiO}_2 = -910.9$)

