Today Wednesday Nov 7 sections 9.8 - 9.10
Friday 11/9 sections 6.7, 9.12, 9.13
Sunday Nov 11 Problem club with Ali
Monday CK4

Warm up: Calculate ΔH_{rxn} for

$2H_2S(g) + SO_2(g) \rightarrow 3S(s) + 2H_2O(l)$ $\Delta H_{rxn} =$

ΔH_F°	$= 20.6\ kJ/mol$	$-296.8\ kJ/mol$	$0\ kJ/mol$	$-285.8\ kJ/mol$
	$\times -2\ mol$	$\times -1\ mol$	$\times 3\ mol$	$\times 2\ mol$
	$+41.2\ kJ$	$+296.8\ kJ$	0	$-571.6\ kJ$ $= \boxed{-233.6\ kJ}$

ΔH_f° ← standard conditions (298k, 1atm)

* All elements under standard condition have $\Delta H_f^\circ = 0$

What is q if 60.7g of H_2S and 75.2g SO_2 are reacted?

$2H_2S(g) + SO_2(g) \rightarrow 3S(s) + 2H_2O(l)$ $\Delta H_{rxn}^\circ = -233.6\ kJ$

go moles: 60.7g 75.2g

1.78mol 1.17mol

~~÷2 0.89~~ LR ~~÷1 1.17~~

$$q = \Delta H \times n = \frac{-233.6\ kJ}{2\ mol\ H_2S} \Big| \frac{1.78\ mol\ H_2S}{} = \boxed{-208\ kJ}$$

↑ extensive

density 1.00 g/mL 1.00 g/mL

$HNO_3(aq) + NaOH(aq) \rightarrow H_2O(l) + NaNO_3(aq)$ $\Delta H = ?$

100.0 mL 90.0 mL

0.10 mol/L LR 0.13 mol/L

go moles: $n = MV = 0.010$ mol 0.0117 mol

$\Delta T = 0.705$ deg

Calculate ΔH_{rxn}.

$q_{cal} = C_{soln} \times m_{soln} \times \Delta T$

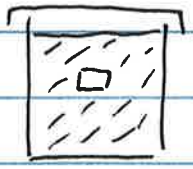
$q_{cal} = \left(4.18 \frac{J}{g \cdot deg}\right)(190 g)(0.705 deg)$

$q_{cal} = 560$ J

$q_{rxn} = -q_{cal} = -560$ J

$$\Delta H = \frac{-560 \text{ J}}{0.010 \text{ mol } HNO_3} \left| \frac{1 \text{ mol } HNO_3}{} \right| \frac{1 \text{ kJ}}{1000 \text{ J}} = -56.0 \text{ kJ}$$

bomb calorimeter



$q_{cal} = q_{H_2O} + q_{\text{bomb calorimeter}}$

$= C \times m_{H_2O} \times \Delta T + \text{Cal Constant} \times \Delta T$

$H_2 \rightarrow 2H$ $\Delta H = +436$ kJ

$2H \rightarrow H_2$ $\Delta H = -436$ kJ

$H \rightarrow \frac{1}{2} H_2$ $\Delta H = -218$ kJ

The heat of formation is the enthalpy change when 1 mol of a substance is made from its elements under standard conditions

$S(s) + O_2(g) \rightarrow SO_2(g) \quad \Delta H_f^\circ = -296.8\ kJ$

$S(s) + \frac{3}{2}O_2(g) \rightarrow SO_3(g) \quad \Delta H_f^\circ = -198\ kJ$

* for ΔH_f° the coefficients can be "funny" since the product has to be 1 mole

Use these equations to create a new one

$2S(s) + 3O_2(g) \rightarrow 2SO_3(g) \quad \Delta H^\circ = -395.7\ kJ$

Calculate ΔH for $2SO_2 + O_2 \rightarrow 2SO_3$

$2SO_2(g) \rightarrow 2S(s) + 2O_2(g) \quad \Delta H^\circ = (+296.8\ kJ)2$

$+$

$2S(s) + 3O_2(g) \rightarrow 2SO_3(g) \quad \Delta H^\circ = -395.7\ kJ$

$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g) \quad \Delta H^\circ = +197.9\ kJ$

Using bond energies

$NH_3 + Cl_2 \rightarrow NH_2Cl + HCl$