Chemistry II Chapter 6 Test Name Teacher

SHOW ALL WORK

1. Given the following thermochemical equations:

$2Cu_{(s)} + O_{2(g)} \rightarrow 2CuO_{(s)}$ $\Delta H^\circ = -155$ kJ $\frac{1}{3}$

$Cu_{(s)} + S_{(s)} \rightarrow CuS_{(s)}$ $\Delta H^\circ = -53.1$ kJ $\frac{1}{3}$

$S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$ $\Delta H^\circ = -297$ kJ $-\frac{1}{3}$

$4CuS_{(s)} + 2CuO_{(s)} \rightarrow 3Cu_2S_{(s)} + SO_{2(g)}$ $\Delta H^\circ = -13.1$ kJ $\frac{1}{3}$

calculate the value of ΔH° (in kilojoules) for the reaction

$CuS_{(s)} + Cu_{(s)} \rightarrow Cu_2S_{(s)}$

Q 6.68

$\frac{1}{3}$ $\frac{3}{3}CuS + \frac{2}{3}CuO \rightarrow \frac{3}{3}Cu_2S + \frac{1}{3}SO_2$ because Cu_2S is on right side

$-\frac{1}{3}$ $\frac{1}{3}SO_2 \rightarrow \frac{1}{3}S + \frac{1}{3}O_2$ because SO_2 must be cancelled.

$\frac{1}{3}$ $\frac{1}{3}Cu + \frac{1}{3}S \rightarrow \frac{1}{3}CuS$ because S must be cancelled

$\frac{1}{3}$ $\frac{2}{3}Cu + \frac{1}{3}O_2 \rightarrow \frac{2}{3}CuO$ because O_2 must be cancelled

---

$CuS + Cu \rightarrow Cu_2S$ $\Delta H = 25.3$ kJ

2. How many joules are required to raise the temperature of 0.500 kilograms of liquid water by 24.0 °C? How many calories are needed?

Q 6.29

$Q = m C_w \Delta T$

$(500g)(4.184)(24.0)$

50208 J

50200 J

12 000 cal

3. Why do the oceans have a moderating influence on the summer and winter temperatures of landmasses along their shores?

Question 6.25

Large Specific heat of H_2O warms in cold weather + cools in warm weather

4. A metal specimen with a mass of 25.467 g was heated to 100.0°C in boiling water. The sample was quickly dried and placed in a styrofoam cup that contained 15.0 g of H_2O having a temperature of 24.3°C. The mixture was stirred quickly and the temperature of the water rose to 31.2°C. Calculate the specific heat of the metal.

Q 6.33

$T_i - T_f$ because Q is +

$$Q_{metal} = (25.467_g)\, C_{metal} (100.0 - 31.2)$$

$$Q_{H_2O} = (15.0_g)(4.184)(31.2 - 24.3)$$

$$Q_{gained} = Q_{lost}$$

$$(25.467_g)(C_{Metal})(68.8) = (15.0)(4.184)(6.9)$$

$$c = 0.25 \frac{J}{g\,°C}$$

5. The combustion of 1 mole of benzene, $C_6H_{6(l)}$, to produce $CO_{2(g)}$ and $H_2O_{(l)}$ liberates 3271 kJ when the products are returned to 25°C and 1 atm. What is the standard heat of formation of $C_6H_{6(l)}$ expressed in kilojoules per mole?

Example 6.8

$$C_6H_{6(l)} + 7\tfrac{1}{2}O_{2(g)} \longrightarrow 6CO_{2(g)} + 3H_2O_{(l)} \qquad \Delta H = -3271\,kJ$$

$$\Delta H^\circ = \left[6\Delta H_{CO_2} + 3\Delta H_{H_2O}\right] - \left\{\Delta H_{C_6H_6} + 7.5\Delta H_{O_2}\right\}$$

$$-3271 = \left[6(-394) + 3(-286)\right] - \left\{\Delta H_{C_6H_6} + 0\right\}$$

$$\Delta H_{f\,C_6H_6}^{\circ} = +49\ kJ/mole$$

6. What is heat energy? By what mechanism does heat flow from a hot object into a cool object?

Problem 6.11

Collision of Fast moving particles (hot) with slower moving particles (slow) at interface. E is transfered from high to low.