Review of Heat (Temperature Changes & Phase Changes)

Temperature Change $Q = mc\Delta T$

Phase Change $Q = m\Delta H^\circ$

$\Delta H^\circ_{fusion} = 333\ J/g$

$\Delta H^\circ_{vaporization} = 2260\ J/g$

fusion => melting/freezing @ 0°C

vaporization => evaporation/condensation @ 100°C

(+) Heating / (-) Cooling Curves.

Calorimetry Problems

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

A calorimeter contains 252g of water at a temperature of 22.3°C. A piece of hot gold (5.3g) is added to the water. The final temperature of the gold and water is 38.9°C. What was the temperature of the hot gold when placed in the water?

Water is heated up
gold is cooled

$Q_{gained\ by\ water} = mc\Delta T$ ($38.9^\circ C - 22.3^\circ C$)

$$Q_{H_2O} = (252g)\left(4.18\frac{J}{g^\circ C}\right)(16.6^\circ C)$$

heat gained by the water (equal to the heat lost by the gold)

$$Q_{H_2O} = 17485.776\ J$$

heat lost by gold

$$Q_{gold} = mc\Delta T$$

$$-17485.776\ J = (5.2g)\left(0.1291\frac{J}{g^\circ C}\right)(38.9^\circ - T_i)$$

$$-\frac{17485.776\ J}{(52g)\left(0.1291\frac{J}{g^\circ C}\right)} = 38.9^\circ - T_i$$

$$-2604\,6.85694 = 38.9^\circ - T_i$$

$$T_i = 38.9^\circ C + 2604\,6.85694^\circ C$$

Should have used a larger mass of gold and small temp. change for water

WOW! that's hot!

This does show how resistant water is to large changes in temperature due to its high specific heat capacity!