Virtual Calorimetry Lab:

Use the simulator at the link below to complete the outlined tasks:
https://media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/calorimetry/Calor.php

Directions for using the Simulator:
Click on link above.
Click on the "Experiment" tab.
Click on "Run Demonstration" and follow the prompts to learn how to use the simulator. Once you feel like you understand how the simulator works, go back to the "Experiment" tab and click on "Run Experiment".

Procedure: After each question, simply click the "Reset" button to work the next problem.

1. Determine the final temperature of a mixture of 50 grams of water at 10 °C added to 120 grams of water at 80 °C. Show all work. Use the simulator to check your answer.

$Q = Q_{water\ 10°C \to T_f} + Q_{water\ 80° \to T_f} = \emptyset$

$mc\Delta T + mc\Delta T$

$50g\ (4.184\ J/g°C)(T_f - 10°C) + 120g\ (4.184\ J/g°C)(T_f - 80°C) = \emptyset J$

$209.2\ T_f - 2092 + 50208\ T_f - 40166.4 = \emptyset$

$711.28\ T_f = 42,258.4$

$T_f = 59.41°C$

2. Use the simulator to determine the final temperature of 80 grams of water initially at 20 °C (Note: When adding metals to water, the water temperature always starts at 20 °C, you do not need to set this parameter.) when a 15 gram piece of iron at 150 °C is placed in it. (To select iron, click on the "solids" tab and use the pop-up menu.)

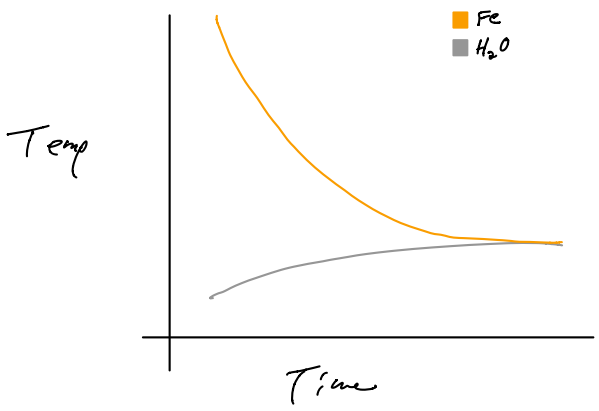
$80g\ (4.184\ J/g°C)(T_f - 20°C) + 15g\ (0.449\ J/g°C)(T_f - 150°C) = \emptyset$

$334.72\ T_f - 6694 + 6.735\ T_f - 1,010.25 = \emptyset$

$341.45\ T_f = 7704.65$

$T_f = 22.56°C$

3. Click the "show graph view" box and then click "replay" for the experiment in #2. Draw the resulting graph. How do the two lines on the graph compare? What is the main conclusion you can draw from the graph?



The Iron has the most dramatic temp change.

The water is absorbing heat energy from the Iron.

4. How much heat energy in joules, q, did the water gain in the experiment in #2? Use the formula: q = mcΔT where m = mass of water being heated in grams; c = specific heat of water = (4.18 J/g °C); and ΔT = the change in the water's temperature in degrees Celsius.

$Q = mc\Delta T$

$= 80g\ (4.18\ J/g°C)(22.86°C - 20°C)$

$Q = 850\ J$

5. Use the simulator to determine the final temperature of 80 grams of water initially at 20 °C when a 15 gram piece of silver at 150 °C is placed in it.

$80g\ (4.184\ J/g°C)(T_f - 20°C) + 15g\ (0.235\ J/g°C)(T_f - 150°C) = 0$

$334.72\ T_f - 6694 + 3.525\ T_f - 528.75 = 0$

$338.245\ T_f = 7222.75$

$T_f = 21.35°C$