Name: _____

Heat Problems

1. A 0.400- kg block of iron is heated from 22°C to 52 ^{o}C. How much heat had to be transferred to the iron?

2. How much heat is absorbed by 60.0 g of copper when its temperature is raised from 20 ^{o}C to 80 ^{o}C?

3. How much heat is released when 50.0 g of water cools from 83.0 ^{o}C to 4.5 ^{o}C?

4. What is the specific heat of a 124 g sample of brass if 3.94 x 10^3 J raises the temperature of the brass from 12.5 ^{o}C to 97.0?

5. 2.8 x 10^5 J of thermal energy are added to a sample of water and its temperature changes from 20 ^{o}C to 35 ^{o}C. What is the mass of the water?

6. If 350 J of heat energy are added to 100 g of a metal and the temperature changes by 25 ^{o}C, what is the specific heat of the metal? What is the identity of the metal?

7. 390 J of energy are added to a sample of lead and the temperature of the lead increases from 30 ^{o}C to 70 ^{o}C. What is the mass of the lead?

8. Calculate the heat required to raise the temperature of 50 g of silver by 30°C.

9. 1000J of heat increases the temperature of a sample of water by 15 ^{o}C. What is the mass of the water?

10. 10g of an unknown metal requires 39J of energy to increase its temperature from 50 °C to 60 °C. What is the specific heat of the metal? Identify the metal (see reference sheets).

Answers:

1. 5,388 J
2. 1,386 J
3. 16,422 J
4. 0.376 J/g °C
5. 4,500 g
6. 0.14 J/g °C ; Hg
7. 75.6 g
8. 360 J
9. 15.9 g
10. 0.39 J/g °C

Heat Lost = Heat Gained

1. When 80.0 grams of a certain metal at 90.0 °C was mixed with 100.0 grams of water at 30.0 °C, the final equilibrium temperature of the mixture was 36.0 °C. What is the specific heat of the metal?

2. Calculate the specific heat of a metal if a 55.0 g sample of an unknown metal at 99.0 °C causes a 1.7 °C temperature rise when added to 225.0 g of water at 22.0 °C.

3. A piece of an unknown metal with mass 23.8 g is heated to 100.0ºC and dropped into 50.0 cm^3 of water at 24.0ºC. The final temperature of the system is 32.5ºC. What is the specific heat of the metal?

4. A blacksmith heated an iron bar to 1445ºC. The blacksmith then tempered the metal by dropping it into 42,800 cm^3 of water that had a temperature of 22ºC. The final temperature of the system was 45ºC. What was the mass of the bar? *Note: Specific heat of iron is 0.4494 J/g·Cº.*

Answers:

1. 0.58 J/g °C
2. 0.386 J/g °C
3. 1.11 J/g °C
4. 6,500 g