$q = mC\Delta T$ ← formula used

Answer Key

C_{H2O} = 4.18 J/g°C

1. How much energy must be absorbed by 20.0 g of water to increase its temperature from 283.0 °C to 303.0 °C?

$q = (20)(4.18)(303 - 283)$

$q = 1672\ J$

2. When 15.0 g of steam drops in temperature from 275.0 °C to 250.0 °C, how much heat energy is released?

$q = (15.0)(4.18)(250 - 275)$

$q = -1567.5\ J$

3. How much energy is required to heat 120.0 g of water from 2.0 °C to 24.0 °C?

$q = 120(4.18)(24-2)$

$q = 11035.2\ J$

4. If 720.0 g of steam at 400.0 °C absorbs 800.0 kJ of heat energy, what will be its increase in temperature?

$800.0 = (720)(4.18)(\Delta T)$

$\Delta T = 0.2660°C$

5. How much heat (in kJ) is given out when 85.0 g of lead cools from 200.0 °C to 10.0 °C? (Cp of lead = 0.129 J/g °C)

$q = (85)(0.129)(10 - 200)$

$q = -2083.35\ J$

6. If it takes 41.72 joules to heat a piece of gold weighing 18.69 g from 10.0 °C to 27.0 °C, what is the specific heat of the gold?

$41.72 = (18.69)(C)(27 - 10)$

$C = 0.13\ J/g°C$

7. 8. A certain mass of water was heated with 41,840 Joules, raising its temperature from 22.0 °C to 28.5 °C. Find the mass of water

$41840 = m(4.18)(28.5 - 22)$

$m = 1539.9\ g$

Formula used for all problems → $(m_1)(c_1)(\Delta T_1) = -(m_2)(c_2)(\Delta T_2)$

$q_1 = -92$

8. A lump of chromium (Cr) has a mass of 92.5 grams and a temperature of 89.5°C. It is placed into a calorimeter with 75.2 g of water at 20.5°C. After stirring, the final temperature of the mixture is 27.4°C. What is the specific heat of Cr metal?

$(75.2)(4.18)(27.4-20.5) = -(92.5)(c)(27.4-89.5)$

$C = 0.377\ J/g°C$

9. A sample of Ag metal is heated to 80.0 °C and dropped into 50.0 g of water at 23.2 °C. The final temperature of the Ag-water mixture is 27.6 °C. The specific heat of silver is 0.234 J/g °C. What is the mass of the silver?

$(50)(4.18)(27.6-23.2) = -(m)(0.234)(27.6-80)$

$m = 75g$

10. A 10.0 kg piece of metal at 50.0°C is placed in 1.00 kg of water at 10.0°C. The metal and water come to the same temperature of 31.4°C. What is the specific heat of the metal?

$(1.00)(4.18)(31.4-10) = -(10)(c)(10-50)$

$C = 0.224\ J/g°C$

11. A 79.g g sample of silver at a high temperature is dropped into 53.5 g sample of water at 25.5 °C, the final temperature of the mixture is 28.9 °C. What was the ***initial temperature*** of the silver?

$(53.5g)(4.18)(28.9-25.5) = -(79)(0.234)(28.9-T_i)$

$760.342 = -18.486(28.9-T_i)$

$760.342 = 534.2454 + 18.486T_i$

$T_i = 70°C$