

CHEM-1094 THERMOCHEMISTRY

If heat is added to a substance, the temperature is raised. If heat is removed, the temperature is lowered. The quantity of heat, Q , added or removed can be calculated by using the equation:

$$Q = m c \Delta t$$

Where m = mass of the substance

s = specific heat of the substance

Δt = change in temperature (final temperature-initial temperature)

Q is measured in calories or joules. A calorie is defined as the quantity of heat required to raise the temperature of 1 g of water by 1°C. Specific heat of any substance is the quantity of heat required to raise the temperature of 1 g substance by 1°C. (1 cal = 4.184 J)

PROBLEMS:

1. Calculate the quantity of heat in joules required to raise the temperature of 250. g of lead from 100.°C to 200.°C. The specific heat of lead is 0.130 J/g °C. **(3250 J)**
2. It took 17.5 cal of heat to raise the temperature of 10.0 g a substance by 8.58°C. What is the specific heat of the substance? **(0.204 cal/g °C)**
3. Calculate the amount of aluminum used if 800.0 cal of heat are required to heat it from 40.0°C to 80.0°C. The specific heat of aluminum is 0.217 cal/g °C. **(92.2 g Al)**
4. When 685 g of copper absorbs 260. J of heat, what is the rise in temperature? The specific heat of copper is 0.385 J/g °C. **(0.989 °C)**
5. Calculate the resultant temperature when 50.0 g of silver at 150.°C is added to 50.0 g of water at 20.0°C. The specific heat of water and silver are 4.184J/g °C and 0.234J/g °C, respectively. **(26.9°C)**
6. If 100.0 g of a metal at 100.0°C is added to 100.0 g of water at 25.0°C, the final temperature is 31.3°C. What is the specific heat of the metal? **(0.384 J/g °C)**
7. Calculate the final temperature if 50.0 g of water at 75.0°C is added to 75.0 g of water at 42.0°C. **(55.2°C)**

