

Name: Ahmed Faizan Date: 12 May Period:       

## Specific Heat and Heat Capacity Worksheet

**DIRECTIONS:** Use  $q = (m)(C_p)(\Delta T)$  to solve the following problems. Show all work and units.

Ex: How many joules of heat are needed to raise the temperature of 10.0 g of aluminum from 22°C to 55°C, if the specific heat of aluminum is 0.90 J/g°C?

$$\begin{aligned} q &= ? & \Delta t &= 55 - 22 = 33^\circ\text{C} & q &= m s \Delta t \\ m &= 10\text{g} & s &= 0.9 \text{ J/g}^\circ\text{C} & &= 10 \times 0.9 \times 33 \\ & & & & &= \underline{297 \text{ J}} \end{aligned}$$

1. The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorb?  $C$  for water = 4.18 J/g°C

$$\begin{aligned} \Delta t &= 26.4 - 24.5 = 2 & q &= m s \Delta t \\ s &= 4.18 \text{ J/g}^\circ\text{C} & &= 335 \times 4.18 \times 2 \\ m &= 335\text{g} & &= \underline{2800.6 \text{ J}} \end{aligned}$$

2. How much heat in kilojoules has to be removed from 225g of water to lower its temperature from 25.0°C to 10.0°C?

$$\begin{aligned} \Delta t &= 25 - 10 = 15 & q &= m s \Delta t \\ m &= 225\text{g} & &= 225 \times 4.18 \times 15 \\ s &= 4.18 \text{ J/g}^\circ\text{C} & &= \underline{14107.5 \text{ J}} \\ 1\text{J} &= 1 \times 10^{-3} \text{ KJ} & \therefore &= \underline{14.1075 \text{ KJ}} \end{aligned}$$

3. To bring 1.0kg of water from 25°C to 99°C takes how much heat input?

$$\begin{aligned} m &= 1\text{kg} = 1000\text{g} & q &= 1000 \times 4.18 \times 74 \\ \Delta t &= 99 - 25 = 74 & q &= \underline{309320 \text{ J}} \\ s &= 4.18 \text{ J/g}^\circ\text{C} & & \end{aligned}$$

An insulated cup contains 75.0g of water at 24.00°C. A 26.00g sample of metal at 82.25°C is added. The final temperature of the water and metal is 28.34°C. What is the specific heat of the metal?

Imp

$$\begin{aligned} (q_{\text{water}} &= -q_{\text{metal}}) & (C = m s) &\rightarrow s = \frac{C}{m} \\ q_{\text{water}} &= 75 \times 4.18 \times (28.34 - 24) & q &= m s \Delta t \\ &= 1252 & 1252 &= 26 \times s \times (82.25 - 28.34) \\ & & & 1252 = 26 \times 53.91 \times s \\ & & & s = \underline{0.893 \text{ J/g}^\circ\text{C}} \end{aligned}$$

5. A calorimeter has a heat capacity of 1265 J/°C. A reaction causes the temperature of the calorimeter to change from 22.34°C to 25.12°C. How many joules of heat were released in this process?

$$\begin{aligned} C &= 1265 \text{ J/}^\circ\text{C} \\ \Delta t &= 25.12 - 22.34 = 2.78 \\ q &= ? \\ q &= C \Delta t \\ &= 1265 \times 2.78 \\ &= \underline{3516.7 \text{ J}} \end{aligned}$$

# Answers Of Specific Heat

**E. N. Ramsden**



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