

Specific Heat Calculations

Name: _____

Heat (Q) = specific heat(c) * mass (m) * change in temperature (ΔT)

$$\Delta T = T_{\text{final}} - T_{\text{initial}}$$

Heat (Q) uses the unit Joules (J)

Specific Heat (c) uses the unit Joules per grams degrees Celsius ($\text{J/g}^\circ\text{C}$)

Mass (m) uses the units grams or kilograms (g or kg)

Temperature (T) is in degrees Celsius ($^\circ\text{C}$)

If Q is positive, the reaction is endothermic. If Q is negative, the reaction is exothermic.

1. Gold has a specific heat of $0.129 \text{ J/g}^\circ\text{C}$. How many joules of heat energy are required to raise the temperature of 15 grams of gold from 22°C to 85°C ?

2. An unknown substance with a mass of 100g absorbs 1000J while undergoing a temperature increase of 15°C . What is the specific heat of the substance?

3. A 40g sample of water absorbs 500J of energy. How much did the water temperature change? The specific heat of water is $4.18\text{J/g}^\circ\text{C}$.

4. If 335g of water at 65.5°C loses 9750J of heat, what is the final temperature of the water? The specific heat of water is $4.18\text{J/g}^\circ\text{C}$.

5. A calorimeter has a specific heat of $1265\text{J/g}^\circ\text{C}$. A reaction causes the temperature of the 50.0g calorimeter to change from 22.34°C to 25.12°C . How many joules of heat were released in the reaction?

6. What is the specific heat of silicon if it takes 192J to raise the temperature of 45g of silicon from 14°C to 20°C ?

7. Assuming that Coca Cola has the same specific heat as water ($4.18\text{J/g}^\circ\text{C}$), calculate the amount of heat transferred when one can (350g) is cooled from 25°C to 3°C .

8. What mass of water will change its temperature from 15°C to 18°C when 525J of heat is added to it? The specific heat of water is $4.18\text{J/g}^\circ\text{C}$.

9. A 0.3g piece of copper is heated and fashioned into a bracelet. The amount of energy transferred by heat to the copper is 66,300J. If the specific heat of copper is $390\text{J/g}^\circ\text{C}$, what is the change in the copper's temperature?

10. A 15.75g piece of iron absorbs 1086.75J of heat energy, and its temperature changes from 25°C to 175°C . Calculate the specific heat of the iron.

11. To what temperature will a 50.0g piece of glass raise if it absorbs 5275J of heat energy and its specific heat is $0.50\text{J/g}^\circ\text{C}$? The initial temperature of the glass is 20.0°C .

12. The specific heat of ethanol is $2.46\text{J/g}^\circ\text{C}$. Find the heat required to raise the temperature of 193g of ethanol from 19.0°C to 35.0°C .

13. Calculate the number of joules given off when 32.0g of steam cools from 110°C to ice at -40°C . The specific heat of water is $4.18\text{J/g}^\circ\text{C}$.

14. 25g of mercury is heated from 25°C to 155°C , and absorbs 455J of heat in the process. Calculate the heat capacity of mercury.

15. If a sample of chloroform is initially 25°C , what is its final temperature if 150g of chloroform absorbs 1000J of heat? The specific heat of chloroform is $0.96\text{J/g}^\circ\text{C}$.