

Name: _____

15 Pts.

Honors Chemistry Worksheet: Heat Calculations

On a separate piece of paper answer these questions.
Show ALL work. Box final answer with units and sig figs.

- How many kiloJoules of energy are needed to raise the temperature of 1.50dm^3 of water from 20.0°C to 37.0°C ?
- The specific heats of three different liquid substances are listed as:
Carbon tetrachloride: $0.856\text{ J/g}^\circ\text{C}$ Benzene: $1.74\text{ J/g}^\circ\text{C}$ Acetic Acid: $2.05\text{ J/g}^\circ\text{C}$
An experimenter found that 1.42 kJ of heat energy raised the temperature of 19.70g of an unknown liquid substance by 36.4°C . What substance could this be? (Show all work)
- Mercury has a density of 13.546 g/cm^3 and a specific heat of $0.139\text{ J/g}^\circ\text{C}$. How much energy in Joules is released from 25.00 cm^3 of Hg when it cools from the boiling point of Hg (357°C) to its freezing point (-39°C)? *scientific notation!*
- How many kJ is released from a 2.0 liter bottle of cola when it cools from 70°F (294K) to its freezing point? (Assume that the cola has the same properties as water)
- What (minimum) mass of glass ($C_p = 0.749\text{ J/g}^\circ\text{C}$) at 26.0°C is needed to absorb 5.00×10^4 Joules of heat energy if its final temperature can not exceed 275°C ?
- What final temperature will 120.0 grams of benzene ($C_p = 1.74\text{ J/g}^\circ\text{C}$) at 7.0°C have after it absorbed 2.2kJ of heat?
- 3.0 kg of Osmium metal ($C_p = 0.130\text{ J/g}^\circ\text{C}$) at 241 K is heated to 394 K . How much energy is needed for this?
- 14.22 g of a substance absorbs 1.77 kJ of heat and undergoes a temperature change from -23.0°C to 31.0°C . What is the specific heat of the metal?
- Calculate the amount of heat in kJ that was absorbed by a Sn ($C_p = 0.220\text{ J/g}^\circ\text{C}$, $D = 7.31\text{ g/cm}^3$) roof that measures 32 feet by 20. feet if the sample is 0.0104 feet thick when the roof under goes a 15.0°C temperature change. *Use scientific notation for final answer.*
- The equation for converting $^\circ\text{F}$ to $^\circ\text{C}$ is $^\circ\text{C} = (^\circ\text{F} - 32)5/9$. How many Joules is needed to raise the temperature of 15.0 cm^3 of water from 65°F to body temperature, 98.6°F ? *Each $^\circ\text{F}$ temperature must be converted separately, not the Celsius ΔT .*
- The density of gold is 19.3 g/cm^3 . What volume in cm^3 of gold can absorb 2.3kJ of heat when undergoing a 5.0°C ΔT . It requires 0.128 J of heat to raise the temperature of 1g of Au 1°C .
- Calculate the final temperature of a sample of Te ($C_p = 0.201\text{ J/g}^\circ\text{C}$) when a 82.500g sample at 12.0°C releases $2.00 \times 10^3\text{ J}$ of heat energy.
- Calculate the specific heat of a metal if $2.361 \times 10^2\text{g}$ of it at 99.5°C is added to 125.0 ml of water at 22.0°C . The final temperature of the system is 25.4°C .
- A lump of chromium has a mass of 95.3g and a temperature of 90.5°C . It is then placed into a calorimeter with 75.2 ml of water at 20.5°C . After stirring, the final temperature of the water, metal, and calorimeter is 28.6°C . What is the specific heat of the Cr metal?
- 60.0g of Al ($C_p = 0.900\text{ J/g}^\circ\text{C}$) at 96.0°C is added to $500.$ grams of water at 16.0°C . What final temperature will the water and Al reach?