

CHEMICAL HEAT

Classic

Calorimetry

Date:

- How is a calorimeter used to measure heat?
- A quantity of 3.2 g of naphthalene, $C_{10}H_8$, was burned in a calorimeter. Consequently the temperature of water rose from 20 °C to 40 °C. If the quantity of water in the calorimeter was 2000 g and the heat capacity of the calorimeter was 1 kcal/°C, calculate the molar heat of combustion of naphthalene.
- When 1.2 g of C is burned in a calorimeter, the temperature rises by 8 °C. The burning reaction of C is:
$$C + O_2 \Rightarrow CO_2 + 94 \text{ kcal.}$$
Calculate the heat capacity of the calorimeter.
- When 1.6 g of CH_3OH is burned in a calorimeter, temperature rises from 22 °C to 27 °C. If the molar heat of combustion of CH_3OH is -174 kcal/mol , what is the heat capacity of the calorimeter?
- Given that the specific heat of aluminum is $0.23 \text{ cal/g}^\circ\text{C}$. What final temperature would you expect to see if a 30 g chunk of aluminum initially at 100 °C were dropped into 300 g of water at 25 °C?
- When 0.5 mol of $AB_2(s)$ is dissolved in an aluminum calorimeter, which weighs 500 g and has 400 mL of water, the temperature decreases from 25 °C to 5 °C.
$$AB_2(s) \Rightarrow A^{+2}(aq) + 2B^-(aq).$$
What is the molar heat of dissolving of $AB_2(s)$?
- 5.40 g of Al and 16.0 g of Fe_2O_3 are placed in a calorimeter containing initially 4000 g of ice and 4000 g of liquid water. After the reaction
$$2Al(s) + Fe_3O_4(s) \Rightarrow Al_2O_3(s) + 2Fe(s).$$
It is observed that the calorimeter contains 3747.5 g of ice and 4252.5 g of water. What is the ΔH for the foregoing reaction as written?
- A 50 g chunk of unknown metal X is heated to 101.25 °C and then dropped into 500 g of water initially at 25 °C. The water temperature is observed to rise 26.25 °C. Calculate the specific heat of X.
- If a bullet weighing 15.0 g and traveling at 9000 cm/s is fired into a bucket of water containing 500 g of H_2O at 25 °C, what temperature rise should be observed in the H_2O , assuming all the kinetic energy of the bullet is converted to heat?