

**Problem Set- Unit 11**

Note: 1.0 mL of water = 1.0 grams of water

Answer the following on a separate sheet of paper.

1. When 435 J of heat is added to 3.4 g of olive oil at 21°C, the temperature increased to 85°C. What is the specific heat of olive oil?
2. A small pebble is heated and placed in a foam cup calorimeter containing 25.0 mL of water at 25.0°C. The water reaches a maximum temperature of 26.4°C. How many joules of heat were released from the pebble? (Hint: Assume that the heat that is lost by the pebble is gained by the water.)
3. How much heat is absorbed when 28.3 g of H<sub>2</sub>O(s) at 0°C is converted to liquid at 0°C?
4. How much heat is needed to change 55.8 g of methanol (CH<sub>3</sub>OH) from liquid to vapor? (The heat of vaporization of methanol is 38.278 kJ/mole. Pay attention to units!)
5. How much heat is needed to change 240.0 g of H<sub>2</sub>O from ice at -20°C to steam at 115°C? (Hint: There's phase changes and temperature changes.)
6. A 40.60g sample of a metal is boiled in water and placed in 75.0mL of water in a calorimeter at 40.0°C. The water increases to temperature of 55.2°C. What is the specific heat capacity of the metal? (Hint: The heat lost by the metal equals the heat gained by the water.)
7. The temperature of a piece of unknown metal with a mass of 18.0 g increases from 25.0°C to 40°C when the metal absorbs 121.2 J of heat. What is the specific heat of the unknown metal? Compare your answer to the values listed in a table. What is the identity of the unknown metal?
8. To what temperature will a 50.0 g piece of glass raise if it absorbs 5275 joules of heat and its specific heat capacity is 0.50 J/g°C? The initial temperature of the glass is 20.0°C.
9. Calculate the heat capacity of a piece of wood if 1500.0 g of the wood absorbs  $6.75 \times 10^4$  joules of heat, and its temperature changes from 32°C to 57°C.
10. 100.0 mL of 4.0°C water is heated until its temperature is 37°C. If the specific heat of water is 4.18 J/g°C, calculate the amount of heat energy needed to cause this rise in temperature.
11. 25.0 g of mercury is heated from 25°C to 155°C, and absorbs 455 joules of heat in the process. Calculate the specific heat capacity of mercury.
12. How much energy must be absorbed by 20.0 g of steam to increase its temperature from 283.0°C to 303.0°C?
13. When 15.0 g of steam drops in temperature from 275.0°C to 250.0°C, how much heat energy is released?
14. How much heat (in J) is given out when 85.0 g of lead cools from 200.0°C to 10.0°C? (Use the value for the specific heat of lead given on the Reference Tables.)