

Chemistry Module 2 Homework

Assignment #1: Show your calculations.

Read pages 37 – 48.

1. What is energy?
2. What is heat?
3. Write the First Law of Thermodynamics.
4. Explain the difference between kinetic and potential energy.
5. Classify each of the following as having either potential or kinetic energy, or both:
 - a. a wooden log burning
 - b. a new battery in its packaging
 - c. a bolt of lightning
 - d. a peanut butter and jelly sandwich
 - e. a rollercoaster at the top of a hill
 - f. an arrow flying through the air
6. List three units used to measure energy.
7. Surgical instruments may be sterilized by heating them at 180.0°C for 1.5 hours. Convert the temperature to
 - a. Fahrenheit
 - b. Kelvin.
8. The boiling point of helium is 4.0 K.
 - a. What is the boiling point in Celsius?
 - b. What is it in Fahrenheit?
9. What is the difference between a calorie and a Calorie?
10. A calorie is the amount of energy needed to heat 1.0 gram of water 1.0 degree Celsius. How many calories does 35.0 g of water absorb when it is heated from 22.0°C to 80.0°C ?
11. A typical adult male uses approximately 2400 Calories of energy each day. How many Joules is that?
12. Honors: A 2-inch thick piece of two-layer chocolate cake with frosting provides 1670 kilojoules of energy. What is this in calories? Show your calculations.

13. What is specific heat capacity?
14. What is the specific heat capacity of water? How does the specific heat of water compare to the specific heat of most other materials (lower than, higher than, same as)?
15. How many Joules does it take to heat up 48.0 g of aluminum from 18.0°C to 32.0°C. The specific heat of aluminum is 0.90 J/(g °C).
16. A 250.0 g piece of iron at room temperature (25°C) loses 850.0 Joules of heat. What will its new temperature be?
17. What is the mass of a silver ring if its temperature changes from 20.0°C to 300.0°C when it absorbs 400.0 calories of heat energy? (Specific heat of silver = 0.057 cal/(g °C))
18. When 435 J of heat energy is added to 3.4 g of olive oil at 21°C, the temperature increases to 85°C. What is the specific heat of olive oil?
19. A calorimeter is filled with 250.0 g of water at 25.1°C. A 85.0-g sample of metal at 110.0°C is dropped in this calorimeter. The temperature of the water increases to 32.1°C.
 - a. How much energy did the water gain from the metal?
 - b. What is the specific heat of the metal?
20. Honors – The temperature of two substances with the same mass increases by 20.0°C when heated. Which absorbs the most energy, the substance with the higher or lower specific heat? Explain your reasoning.
21. Honors – An apple can provide 120.0 kcal of energy. What mass of water could this same amount of energy raise from the freezing point to the boiling point?
22. Honors – A 8.0 g sample of chocolate brownie is placed in a calorimeter. The temperature of the water bath is 21.3°C before the sample is burned and 61.4 after the sample is burned. The mass of the water is 800.0 g. How many calories per gram does the brownie have?