

Chapter 3

STUDY GUIDE3.3 ENERGY

Answer the following questions.

1. Recall that ordinary salt is a compound of sodium and chlorine. List several systems that can be defined in a shaker full of salt.

The salt, the glass-salt-metal cap, ect.

2. What is heat?

Energy that changes Temperature

3. What is a joule?

Derived SI unit for Heat

4. How is the calorie related to the joule?

1 cal = 4.184 J

5. Contrast endothermic and exothermic reactions.

Endothermic - absorbs heat

6. What is specific heat?

C_p - the amount of Heat required to change

Solve the following problems.

7. How many joules are in 1.11 Calories?

$$\frac{1.11 \text{ Calories}}{1 \text{ Cal}} \times \frac{1000 \text{ cal}}{1 \text{ Cal}} \times \frac{4.184 \text{ J}}{1 \text{ cal}} = \boxed{4640 \text{ J}}$$

8. An average baked potato contains 164 Calories. Calculate the energy value of the potato in joules.

$$\frac{164 \text{ Cal}}{1 \text{ Cal}} \times \frac{1000 \text{ cal}}{1 \text{ Cal}} \times \frac{4.184 \text{ J}}{1 \text{ cal}} = \boxed{686,000 \text{ J}}$$

9. How much heat is lost when a 4110-g metal bar whose specific heat is 0.2311 J/g·°C cools from 100.0°C to 20.0°C?

$$Q = m C_p \Delta T \quad \Delta T = 100.0 - 20.0 = 80.0^\circ\text{C}$$

$$\frac{0.2311 \text{ J}}{\text{g } ^\circ\text{C}} \times \frac{4110 \text{ g}}{1} \times \frac{80.0^\circ\text{C}}{1} = 759/85.68 \text{ J}$$

$$\boxed{7.60 \times 10^4 \text{ J}}$$