

## Chapter 3 Math

1. Are these data sets on chemical changes consistent with the law of conservation of mass?
  - a. A 7.5g sample of hydrogen gas completely reacts with 60.0g oxygen gas to form 67.5 grams of water.
  - b. A 60.6g sample of gasoline completely reacts with 243g of oxygen to form 206g of carbon dioxide and 88g of water.
2. A slice of pizza contains 285 Cal of nutritional energy. How many joules does it contain?
3. A 15.0 g iron nail is heated from 20.0°C to 85.0°C. How much heat is absorbed? The specific heat capacity of iron is 0.449 J/g°C.
4. A 30.0 g piece of aluminum is allowed to cool from 75.0°C to 30.0°C. How much heat is released? The specific heat capacity of aluminum is 0.897 J/g°C

### Units of Energy

- Joules
- calories
- Calories

| Energy Conversions: (memorize!) |                                 |
|---------------------------------|---------------------------------|
| 1 calorie (cal)                 | = 4.184 joules (J)              |
| 1 Calorie (Cal)                 | = 1000 calories (cal)           |
| 1 kilowatt-hour (kWh)           | = $3.60 \times 10^6$ joules (J) |

1. The combustion of a wooden match produces approximately 512 cal of heat. How many joules are produced?

### **Equations:**

#### Temperature:

$$K = ^\circ C + 273.15$$

$$^\circ C = \frac{^\circ F - 32}{1.8}$$

\_\_\_\_\_ - energy is released

\_\_\_\_\_ - energy is absorbed

#### Specific Heat Capacity

$$q = m \cdot C \cdot \Delta T$$

q = heat

m = mass

C = specific heat capacity

$\Delta T$  = temperature change