

Name _____

Chemistry

___/___/___

Energy

Energy is the ability to do work or produce heat. Energy can be classified as either **kinetic energy** (energy of motion) or **potential energy** (energy due to position or composition).

One step in understanding energy is realizing the difference between **heat** and **temperature**. Temperature is a measure of the average kinetic energy of the particles in a substance. Heat is the flow of energy due to a temperature difference. Heat travels from a higher temperature object to a lower temperature object until both objects reach the same temperature. The **law of conservation of energy** states that energy cannot be created or destroyed. So in all heat transfers one object is **endothermic** (absorb heat) and the other is **exothermic** (release heat).

In chemistry we measure heat using two different units: calories and joules. A **calorie** is defined as the amount of energy needed to raise the temperature of one gram of water one degree Celsius. The “calorie” you are most familiar with is used to measure the energy content of food. This “calorie” is actually a kilocalorie (1000 calories) and is written with a capital C to distinguish it from the calorie used in chemistry.

The Calories listed for this candy bar are actually kilocalories.

Nutrition Facts		Amount/Serving	%DV*	Amount/Serving	%DV*
Serving Size 1 bar		Total Fat 11 g	17%	Total Carb. 28 g	9%
Calories 230		Sat. Fat 8 g	40%	Dietary Fiber < 1 g	3%
Fat Cal. 100		Cholest. < 5 mg	2%	Sugars 22 g	
*Percent Daily Values (DV) are based on a 2,000 calorie diet.		Sodium 135 mg	6%	Protein 4 g	
		Vitamin A 0%	Vitamin C 0%	Calcium 4%	Iron 2%

The other unit used to measure heat is the **joule**. The joule is the SI (System International) unit.



In this juice label from Amsterdam you can see that energy (“energie”) is given in kilojoules and kilocalories.

To convert between calories and joules keep in mind:

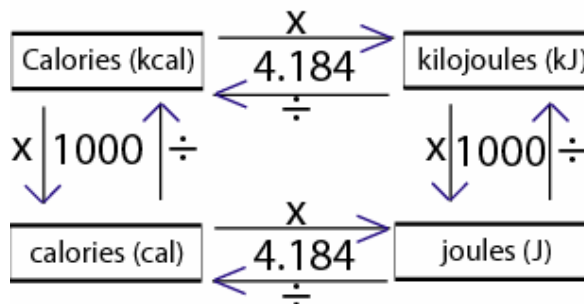
1 calorie (cal) = 4.184 joules (J)

or

1 Calorie (kcal) = 1000 calories (cal) = 4184 joules (J) = 4.184 kilojoules (kJ)

or use this chart:

(you will need to **memorize** one of these conversion methods)



Homework:

1. What is energy?
2. What are the two ways to classify energy?
3. What is the difference between heat and temperature?
4. What is the law of conservation of energy?
5. What is the difference between an endothermic change and an exothermic change?
6. Can you have an exothermic change without an endothermic change? Explain
7. What is the difference between a calorie and a Calorie?
8. How do you convert from calories to kilocalories?
9. How do you convert from kilojoules to joules?
10. How do you convert from calories to joules?
11. How do you convert from kilojoules to kilocalories?
12. Fill in the missing information in the table below:

#	Calories (kcal)	calories (cal)	kilojoules (kJ)	joules (J)
1	150			
2		23456		
3			4.7	
4				9800
5			77.2	
6		867530		
7	420			
8		30968		
9			55.6	