

SOLAR WATER HEATING DATA SHEET

Date	Amount of Water (mL)	Morning Temperature (°C)	Afternoon Temperature (°C)	Amount of energy gained (as heat) from morning to afternoon. (Joules)	Amount of energy lost (as heat) overnight. (Joules)

Specific heat is another physical property of matter. All matter has a temperature associated with it. The temperature of matter is a direct measure of the average motion of the molecules: the greater the motion the higher the temperature. Motion requires energy: the more energy matter has, the higher the temperature it will also have. Heat loss or gain by matter is proportional to energy loss or gain.

To find the amount of heat gained during the day and lost at night, we have to take the specific heat of the water and multiply it by the volume in grams of the water, and then multiply it by the change in the temperature. Because the density of water is roughly 1 g/mL, we can easily convert our mL calculation to grams.

Amount of energy lost or gained = mass of water (g) x specific heat of water (1 calorie/(g°C)) x change in temperature (°C)

If our 1000 mL of water changes from 22 degrees Celsius to 31 degrees Celsius in one day...that would be a change of 9 degrees Celsius and if we put that into the above equation we would get 9000 calories. To convert these calories to joules, we can then multiply that value by the conversion factor: 4.184 J = 1 calorie. In this example, it took 37,656 joules to heat this water!

Note: this “calorie” is not the same unit that we measure the foods we eat; in food calories (designated with a capital C), this is 9 Calories (1 Calorie = 1,000 calories). A candy bar may have on the order of 400 Calories, which is actually 400,000 calories of the energy calories we are using for heating water.

