

Example 25:

Date _____

The Dishwasher!

The environmental impact of washing a load of dirty dishes in an electric dishwasher differs from that of washing them in a sink by hand. A comparison of the two methods may allow consumers to spend their money more wisely. Use the assumptions in the table below to perform the calculations that follow.

All the dishes fit into a single load.
The water entering both the water heater and the sink is at 50 °F.
The water heater and the dishwasher are both 100% efficient.
Washing the dishes by hand requires 20 gallons of water heated to 110 °F.
In one complete cycle, the electric dishwasher uses 10 gallons of water heated to 140 °F and the dishwasher also uses 0.500 kilowatt-hour of electrical energy for its mechanical operations.

- (a) Calculate the total energy, in BTUs, used to wash a load of dishes using the dishwasher.

Other important information:

1 British thermal unit (BTU) the amount of energy needed to raise the temperature of one pound of water 1.0 °F.

1 gallon of water = 8.0 pounds of water.

1 kilowatt-hour = 3400BTU

- (b) Calculate the energy in BTUs used to heat the water for washing a load of dishes by hand.