

T-1 Read pages 292 – 299, section 11-1 in the text book

1. Define the following terms: thermo-chemistry, energy, chemical potential energy, law of conservation of energy, exothermic, endothermic, calorie, Calorie, heat capacity, and specific heat capacity.
 2. The basic heat formula $q = mC\Delta T$ must be recognized from Table T in the regent's reference table. What does each symbol stand for? q , m , C , and ΔT .
 3. If 870. Joules of heat is added to 6.8 grams of olive oil at 294 K, the temperature rises to 358 K. What is the specific heat of olive oil?
 4. How much heat in Joules is required to raise the temperature of one pound of Hg from 293 K to 323 K? (the specific heat of Hg = $0.14 \text{ J/g}\cdot\text{K}$)
 5. How much heat in Joules is required to raise the temperature of one pound of water from 293 K to 323 K? (the specific heat of water is $4.18 \text{ J/g}\cdot\text{K}$)
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T-2 Conversion problems...

1. Rice Krispies cereal is excellent (that's qualitative). One serving of 38 grams contains 120. Calories. Convert that amount of energy into calories (small "c"), joules, and kilo-joules.
 2. Cashews are my favorite nuts, but they are rather expensive (that's qualitative too). One serving is 28 grams and that contains 160 Calories. How many calories, joules, and kilo-joules are in FIFTY grams exactly (that's quantitative).
 3. If you have 23.6 grams of ice at 273 K and melt it in your hand, how many joules of energy did you impart onto the ice to melt it to liquid water without changing its temp?
 4. If you touch 2.90 grams of steam and it condenses onto your thumb, how many joules of energy are released as this steam changes phases?
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T- 3 The specific heat capacity for copper is $0.39 \text{ J/g}\cdot\text{K}$

1. How many joules does it take to raise the temperature of a piece of copper that is 307 grams and at 298 K, until it warms to 327 K?
2. How much energy does it take to warm up 50.0 mL of pure water from 281.5 K to 289.9 K?
3. The "C" of "Hg" is $0.14 \text{ J/g}\cdot\text{K}$. How much heat is lost from 356 grams of mercury when it changes temperature from 369 K to 305 K?

T- 4 How food calories are measured

1. Draw a bomb calorimeter and write a paragraph explaining how it works.
 2. 102 ml of pure water at 278 K is heated with 38,780 Joules of heat energy. What is the final temperature of this water?
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T- 5 More Thermo-Chem Problems

1. You want to make a block of ice to sit on as a gag for a party you are throwing. You fill a plastic container with 14.000 liters of pure water at 288 K. You put it into the deep freezer in your garage, and in 2 days it reaches a final temperature of 268 K. How much energy was removed from this water?

NOTE: the specific heat capacity for ice is not the same as it is for water. When the water reaches 0°C as a solid, it will then lose more energy as the temperature drops below zero. For that step you need to use the basic heat formula, but substitute in the proper specific heat capacity, for ice it is 2.10 J/g·K.

This is a three step problem: cool the water, phase change the water, then cool the ice.

2. Using the heating curve for water below, explain what happens at BC, CD, and EF concerning: temperature, kinetic energy, and potential energy.
3. Why is BC shorter than DE? Use the numbers 334 & 2260 in your answer.

