CHEM 120
WORKSHEET #5

1. Indicate whether each statement describes potential or kinetic energy.
   a. The energy in your food (before you eat).
   b. An earthquake.
   c. The second’s hand in a working watch.
   d. A sled at the top of a hill.

2. Discuss the energy changes (KE, PE) that occur as a bike rider coasts down a steep incline and then pedals back up to the top of the next hill.

3. For a high protein diet, a person consumed a daily diet that contains 350g of protein, 50.g of fat, and 100g of carbohydrates per day, determine:
   a. How many total kilocalories (or nutritional Calories) does this diet contain?
   b. Determine the caloric balance* for this person if they lead a sedentary lifestyle – assume that this means that they sleep for 10. hours and sit for 14 hours. See p. 47.
   c. Determine the caloric balance* if instead this person walks the equivalent of 1.5 hours, runs for 0.50 hours, sits for 14 hours, and sleeps 8.0 hours

*Caloric balance is defined as Calorie intake (foods consumed) minus the Calories expended (energy used) during one day.
4. The following meal items were consumed at a fast food place. Determine the calories of each item and then the total calories of the meal.

<table>
<thead>
<tr>
<th>Item</th>
<th>Calories</th>
<th>Fat</th>
<th>Carbohydrate</th>
<th>Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheeseburger</td>
<td>30 g</td>
<td>38g</td>
<td>28g</td>
<td></td>
</tr>
<tr>
<td>Medium Fries</td>
<td>22 g</td>
<td>57g</td>
<td>7g</td>
<td></td>
</tr>
<tr>
<td>Medium Cola</td>
<td>0 g</td>
<td>58g</td>
<td>0g</td>
<td></td>
</tr>
<tr>
<td>Cookie</td>
<td>9 g</td>
<td>23g</td>
<td>2g</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Show Calculations Below!!!

5. Use the totals from above to calculate the overall percentages of fat, carbohydrate, and protein for the entire meal.

6. Convert the following temperatures.
   a. $85^\circ F = ^\circ C$
   b. $15^\circ C = ^\circ F$
   c. $22^\circ C = ? K$
   d. $345 K = ^\circ F$
7. How much heat does an iron skillet of mass 4500g absorb when heated on the stove from 25.°C to 225.°C? The specific heat of iron is 0.108 cal/g°C.

8. When 50.3g of an unknown metal loses 480 calories of heat, its temperature falls from 99.7°C to 39.4°C. What is the specific heat of this metal in cal/g°C?

9. A block of ice at 0.°C weighing 250.g is placed on a heater and warmed until all of the ice has melted. How much energy was added to melt the ice?

10. How much energy is released when 75.0g of steam at 100°C condenses to liquid water at 100°C?

11. A pan of water containing 200. g of water at 22°C is heated until all of the water is turned into steam at 100.°C. How much energy (in kilocalories) was used to do this?

12. How much energy must be absorbed to completely freeze 150.g of water that is initially put into a freezer at 22°C?
13. For the following reaction, determine

\[ 2 \text{Na} + \text{Cl}_2 \rightarrow 2 \text{NaCl} + 196 \text{ kcal} \]

a. is the reaction ENDOTHERMIC or EXOTHERMIC?

b. decide whether each of the following change will increase the reaction rate, decrease the reaction rate, or keep the rate the same.

- Starting with more \( \text{Cl}_2 \) = INCREASE, DECREASE, or STAY THE SAME?
- Decreasing the temperature = INCREASE, DECREASE, or STAY THE SAME?
- Adding a catalyst = INCREASE, DECREASE, or STAY THE SAME?

c. draw an energy diagram (like those found on page 199 or slide #52 or #52, Ch. 5) for this reaction showing the energy change, the activation energy, the energy level of the reactants, and the energy level of the products.