SCC283
Thermochemistry **Bond Enthalpies** **Spring 2025**

Name and Block:_____

Navigate to the *Energy Changes in Chemical Reactions* simulation found here: http://www.teachchemistry.org/energy-changes. Use the simulation to justify your answers to the questions in **Part 1**.

Part 1 Make sure the **Exothermic** tab is selected.

1. Click the orange button to "Break Bonds." What is needed in order to break a chemical bond?

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2. Click the orange button to "Form Bonds." Explain what occurs when bonds form.

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3. The rearrangement of particles in the simulation is representing a chemical reaction. Explain which type of chemical reaction is consistent with the particle rearrangement shown.

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4. In the overall reaction, what do you notice about the energy associated with the reactants and the energy associated with the products? Refer to the size of the arrows.

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5. Explain how the energy diagram image relates to the chemical reaction.

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Now click on the **Endothermic** tab.

6. Repeat questions 1 - 5 and summarize your answers.

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Part 2

Use the molecular model kits to build one molecule of methane, CH_4, and two molecules of oxygen, O_2 to represent the combustion of methane soap bubbles we saw in the demonstration.

7. Describe the number and type of chemical bonds found in the reactants.

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8. Carefully "break the bonds" of the reactants by disassembling the molecular models. "Form bonds" by reassembling the pieces to create the products. Describe the number and type of chemical bonds found in the products.

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9. Do you think the energy to break a C−H bond is the same as the energy to break a O=O bond? Explain.

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10. Use the average bond enthalpy table to determine the amount of energy involved in the combustion of methane.

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Part 3

We eat in order to convert the energy stored in food into a form useable to sustain life through a process called *metabolism*. The three common energy sources in foods are proteins, fats, and carbohydrates. The energy released when each is metabolized, is the same amount of energy as combustion in air.

1. Glucose is a simple carbohydrate, whereas stearic acid is a common component of saturated fats. Protein, when metabolized, produces about the same amount of energy per gram as carbohydrates. Peanuts are typically 26% protein, 39 % fat, and 22% carbohydrate by weight.
   (a) Estimate the amount of energy produced in Calories when a 50.0 g bag of peanuts is metabolized.
   (b) Calculate the number of Calories/gram of peanuts.