**Energy from Biomass Investigation**

Instructions -

1. Follow the instructions for assembling the calorimeter. In your notebook, draw a diagram and label the parts of the calorimeter.
2. As you conduct the experiment, carefully record your own personal observations. Use the data table to record all measurements.
3. Weigh each biomass fuel sample and record the mass in grams (g).
4. Draw a diagram of each biomass fuel sample.
5. Use the beaker to measure 100 millimeters (ml) of water and pour it into the Erlenmeyer flask.
6. Measure and record the initial temperature of the water in degrees Celsius (°C).
7. Mount the peanut on a needle and place the needle in a piece of clay. If you are also experimenting with wood chips, wood splint pieces, wood pellets, or dried grass, place a piece of screen on top of the crucible dish and then place the material on this screen.
8. Place the biomass fuel sample on the pie plate and carefully light the sample. (The wood chips and pellets may take some time to light.)
9. Once the biomass fuel sample is lit, carefully place the tin can over the burning sample and place the flask of water with thermometer in it on top of the can.
10. Continuously stir the water with the thermometer as the biomass fuel sample burns.
11. Watch the temperature rise, and record the maximum temperature. (The temperature may continue to rise even after the fuel sample is no longer burning.)
12. Allow the calorimeter to cool for 2 to 3 minutes before disassembling. Use pot holders to disassemble the calorimeter.
13. Weigh the final mass of the biomass sample after burning and record this mass in the data table.
14. Repeat the procedure for each biomass fuel sample. Remember to change the water in the flask each time.

Analysis -

Follow the instructions below to analyze the results of your experiment and record all data calculations in your data table.

Calculate calories for each biomass material:

Calories = Volume of water (ml) X Temperature Change (°C)

Convert the amount of calories to British thermal unit (Btu):

1 Btu = 252 calories (convert calories to Btu by dividing by 252)

Calculate the amount of calories produced per gram of each biomass fuel sample:

Calories/gram = (Volume of water x Temperature change) ÷ Mass change (g)

Calculate the amount of Btu produced per gram of biomass:

Btu/gram = Btu ÷ Mass change

Summary Questions -

1. Explain how energy was released and transferred from biomass materials during this experiment.
2. How did the amount of energy released differ among the biomass fuel samples? Can you think of reasons for this difference?
3. Which biomass fuel sample do you think is the most efficient? Why?
4. What are the potential advantages and disadvantages of extracting energy from biomass materials through combustion?