SUSTAINABLE BIOECONOMY
FOR ARID REGIONS

Measuring Food as Fuel:

Procedure and Data Collection Instructions

Name:

Procedure and Data Collection:

Check off each item as you complete it and record your answers on back.

1. Measure out 35 milliliters of water in a graduated cylinder and pour it into the empty soda can. Record the mass of the water in the data table (M_{water})
2. Place the food item on top of the paperclip that is taped to the petri dish. Weigh the petri dish, paper clip, and food item together and record it as $M_{initial}$ (initial weight).
3. Bend the tab of the soda can. Hang it by a paperclip suspended by the metal ring of the ring stand.
4. Place the aluminum pan, petri dish with paperclip and food item directly underneath the soda can. Adjust the height of the can so the food item is only 1.5 inches below the can.
5. Insert a thermometer into the aluminum can so it is not touching the bottom. Record the Initial Temperature ($T_{initial}$) in the data table.
6. Light the food item with a lighter and then make sure it is centered underneath the can. Allow the water to be heated until the food sample stops burning. You may need to relight it if it burned out too soon.
7. Immediately insert the thermometer into the aluminum can so it is not touching the bottom of it. Record the Final Temperature (T_{final}) in the table.
8. Weigh the burnt food item on the holder and record it under M_{final} (final weight) in the table.
9. To analyze a second food item, repeat steps 1 – 8 using the second column on the data table.
10. Do the calculations for ΔT, ΔM, Q and $Q/\Delta M$.
11. Compare answers with other students when completed.
12. Discuss analysis questions (back) as a class.

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Measuring Food as Fuel:

Data Table and Questions

Name:

Name of Food Item =		
Measurement or Calculation	**Values (1st run)**	**Values (2nd run)**
(1) M_{water} (Mass of Water in Can)	g	g
(2) $T_{initial}$ (Initial Temperature)	° C	° C
(3) $M_{initial}$ (Mass of Food + Holder)	g	g
(4) T_f (Final Temperature)	° C	° C
(5) M_{final} (Mass Burnt Food + Holder)	g	g
(6) *$\Delta T = T_{final} - T_{initial}$ (#4 - #2)	° C	° C
(7) *$\Delta M = M_{final} - M_{initial}$ (#5 - #3)	g	g
(8) *$Q = M_{water} \times 1 (C_w) \times \Delta T$ (#1 x 1 x #6)	cal	cal
(9) *$Q/M = Q / \Delta M$ (#8 / #7)	cal/g	cal/g

DATA & CALCULATIONS TABLE

ANALYSIS

Answer the following questions together as a class using all food items.

1. Which food item contains the most energy?

2. Which food is most efficient, or has the most energy in the smallest mass?

3. Which food would make the best fuel to carry on a long hike? Why?

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