Name Period Date

**Is This Brown Stuff Alive? /18**

**STARTER:** (5 pts). Reminder of the day - Organizing your observations into a table makes it easier to understand your data.

1. Examine the specimen in the cup on your table. Write down your observations of the specimen and then determine if it is living or non-living. Defend your answer by referring to your observations.
2. Add some warm water from the sink and a pinch of sugar to the cup. Return to your seat and continue writing down your observations. Again, determine if the specimen is living or non-living. Defend your answer by referring to your observations.

**Scientific Experiment to Test for Metabolism**

We will carry out an indirect test for metabolism. In other words, we will be indirectly testing whether the specimen can use energy, which is one of the characteristics of living organisms.

When living organisms use energy, they break down high-energy molecules like sugar to get the energy they need and give off a gas called carbon dioxide as a by-product of this reaction.

We will test whether our specimen can metabolize sugar and produce a gas which we will presume is carbon dioxide. Specifically, we will test whether our specimen produces a gas when it has sugar available as a food vs. when no sugar is available.

**Today’s research question: Does our specimen metabolize sugar and produce a gas?**

Is the research question, “Is our specimen alive?” a good research question? Why or why not?

**Collect your data here: (8 pts – see rubric below)**

Grading Rubric for Data Table:

|  |  |  |  |
| --- | --- | --- | --- |
|  | 0 points | 1 point | 2 points |
| Neatness | Needs a lot of fine-tuning | Needs some fine-tuning | Extremely tidy and easy to read |
| Table has a title | No title | Has a title but it is not descriptive of what is in the table | Has a title and it describes what is in the table |
| Organization | Not set up as a data table | Attempted to set up a data table | Has separate rows or columns for each test tube and separate rows or columns for each time increment |
| Data | The data collected is not useful | The data collected is somewhat useful in helping to answer the research question | The data collected is useful and helps answer the research question |
| Lab Behavior | Needs more than one reminder | Needs one reminder | On task. Conversations revolve around task at hand, staying at lab table unless getting needed materials |

Lab Procedure

1. Set up four test tubes in a test tube rack.
2. Label each tube with a number, 1-4. Test tubes 1 and 2 will both have the specimen, sugar and water. Test tubes 3 and 4 will both have only the specimen and water, with no sugar.
3. Add warm tap water to a beaker or other provided container, filling it about ¾ of the way to the top.
4. Add in one scoop of the specimen. Mix with a craft stick.
5. Pour the solution so that there is an equal amount in each of the four test tubes being careful not to fill them too full.
6. Add ½ packet of sugar to test tube 1 and the other half to test tube 2. These tubes will be your experimental group. Do not add sugar to tubes 3 and 4.
7. Cover the opening of each test tube with a balloon to catch any gas that is formed. Using the balloon to seal the end of the tests tube, hold a finger over the end of each test tube and shake it vigorously to thoroughly mix the contents.
8. Observe the test tubes and record your observations carefully in a table on the back of the previous page. Then, every 5 minutes for 25 minutes, observe what occurs in the test tubes and any changes in the balloons which cover each test tube, and record your observations. You data table should have room to record observations at the start (0 minutes), then after 5 minutes, 10 min, 15 min, 20 min, and 25 min.

**Conclusion: (3 pts)**

Is the specimen a living thing or a non-living thing?

Defend your answer using your data:

Other possible research questions: