**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_**

**The Carbon Cycle**

**Station 1: Temperature Variation Between Three Different Gasses**

**Materials and Supplies:**

* Hot plate
* 500 ml beaker half filled with water
* 3 large containers (capable of holding 2+ liters of water) with lids
* 3 thermometers (must be able to fit inside of sealed containers)
* Carbon dioxide (use a bicycle cartridge)
* 3 heat radiation lamps
* 3 ring stands

**Method:**

1. Boil water and carefully collect the steam in a large container (1). The container should be fogged in. Tilt the container to quickly insert a thermometer and seal it.
2. Insert a thermometer in an identical container (2) without adding anything else into the container and seal it.
3. Tilt container (3) about 30 degrees with the opening facing up. Fill the container with CO2 using a bicycle CO2 cartridge. Quickly insert a thermometer into the container and seal it.
4. Let all 3 containers **rest for 5 minutes** before taking the initial temperature. The water vapor will give a false high temperature and the carbon dioxide will give a false low temperature if they are not allowed to stabilize to the room temperature. Record initial temperatures from all 3 containers.
5. Place heat radiation lamps exactly 30 cm away from all three of the containers. Do **NOT** put the plastic jars closer to the lamps or they will melt. This will result in faulty data (and a failing grade).
6. Angle the three lamps so they shine at the same location on all three containers.
7. Turn the lamps on for three minutes and then turn them off.
8. Read the temperature for all containers and record data.
9. Repeat temperature readings at 5 minutes intervals three times. Record data.

**Data Tables:**

**Temperature (Heat) Retention with Various Gases**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Container Number 1 Water Vapor** | **Container 1 Initial Temp.**  | **Container 1 Temp. after 3 min. light exposure** | **Container 1 Temp. after 5 min. of cooling** | **Container 1 Temp. after 10 min. of cooling** | **Container 1 Temp. after 15 min. of cooling** |
| **Trial 1** |  |  |  |  |  |
| **Trial 2** |  |  |  |  |  |
| **Trial 3** |  |  |  |  |  |
| **Trial 4** |  |  |  |  |  |
| **Subtotal** |  |  |  |  |  |
| **Average** |  |  |  |  |  |

**Data Tables:**

**Temperature (Heat) Retention with Various Gases**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Container Number 2 Plain Air** | **Container 2 Initial temp.** | **Container 2 Temp after 3 min. light exposure** | **Container 2 Temp after 5 min. cooling** | **Container 2 Temp after 10 min of cooling** | **Container 2 Temp after 15 min. cooling** |
| **Trial 1** |  |  |  |  |  |
| **Trial 2** |  |  |  |  |  |
| **Trial 3** |  |  |  |  |  |
| **Trial 4** |  |  |  |  |  |
| **Subtotal** |  |  |  |  |  |
| **Average** |  |  |  |  |  |

**Data Tables:**

**Temperature (Heat) Retention with Various Gases**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Container Number 3 CO2** | **Container 3 CO2** **Initial temp.** | **Container 3 CO2** **Temp. after 3 min heating** | **Container 3 CO2****Temp. after 5 min cooling** | **Container 3 CO2** **Temp. after 10 min cooling** | **Container 3 CO2** **Temp. after 10 min cooling** |
| **Trial 1** |  |  |  |  |  |
| **Trial 2** |  |  |  |  |  |
| **Trial 3** |  |  |  |  |  |
| **Trial 4** |  |  |  |  |  |
| **Subtotal** |  |  |  |  |  |
| **Average** |  |  |  |  |  |

**Graph all data for the three containers on one table. Include a title, x-axis, y-axis, units of measurement, and a key for each gas (different colors)**

****

Container 1 = \_\_\_\_\_\_\_\_\_\_\_\_\_

Container 2 = \_\_\_\_\_\_\_\_\_\_\_\_\_

Container 3 = \_\_\_\_\_\_\_\_\_\_\_\_\_

**Analysis:**

1. Which gas had the greatest GAIN in heat? Which gas had the greatest LOSS of heat?
2. Which of the gases in our experiment would hold the heat to the Earth the best? **EXPLAIN** your analysis using evidence from your experiment.
3. What energy type was represented by the light bulb? **Why** were these particular light bulbs required instead of another type of light bulb?
4. What control was used in this experiment?
5. What were other variables in this experiment?
6. Illustrate the earth with sunlight being reflected off of the atmosphere and with sunlight trapped in by the atmosphere. Be sure to **label** your illustration.
7. Explain how this illustration would it look if there were more gasses trapping in heat from the sun?
8. **Why** are global warming gases important to us for life on Earth?
9. **What** would happen to the planet if an excess of carbon dioxide or an excess of water vapor accumulated around the planet? (EXPLAIN your analysis using evidence from your data)