Lab Activity H17
Glow Sticks

OUTCOMES

After completing this lab activity, the student should be able to

- design an experiment to answer a simple question related to glow sticks
- gather and interpret the data collected in the experiment
- draw a conclusion and report the results of the experiment

DISCUSSION

Please note that **this lab may take up to 72 hours**. Due to the last-minute nature of many students and at discretion of your professor, the dropbox for this lab may have an extended window of availability.

In this lab you will conduct a real experiment – one for which the outcome is hypothesized and an experiment is designed to test the hypothesis – in much the same way that scientists conduct experiments. In general, this process includes:

- Making a statement of hypothesis/hypotheses.
- Designing the experiment.
- Gathering data.
- Interpreting data.
- Making conclusion(s).
- Reporting result(s).

MATERIALS (Provided By Student)

Materials vary, depending on experimental design

MATERIALS (From Kit)

Go! Temp temperature probe with
Logger Lite or *Logger Pro* software
Glow sticks – 6 Needed
Safety goggles/glasses

PROCEDURE

SAFETY GOGGLES/GLASSES MUST BE WORN FOR THIS EXPERIMENT!

1. Before opening and activating the glow sticks, think of and design:
   - an easy experiment using temperature that would enable one glow stick to glow brighter and one to glow dimmer.
   - an easy experiment using temperature that would enable one glow stick to glow for a longer period of time and one to glow for a shorter period of time.

2. Remove three glow sticks from their packaging. Activate the glow sticks according to the instructions on the package. If there is no packaging, bend the glow stick until you hear or feel the inner vial crack. Shake to mix the contents of the vial. The glow sticks should begin to glow immediately.

CAUTION: DO NOT HEAT GLOW STICKS IN A MICROWAVE OVEN!

THE GLOW STICKS MAY EXPLODE.

CAUTION: DO NOT PLACE GLOW STICKS IN BOILING WATER! (Hot water is OK.)

THE GLOW STICKS MAY EXPLODE IF PLACED INTO BOILING WATER AND HEATED.

3. Assuming that all three glow with the same intensity, use one of the glow sticks as a standard (let it sit untouched). Carry out the experiment you designed to cause one stick to glow brighter and one to glow dimmer.
   - If one glow stick is initially dimmer than the others, use the experiment you designed to make it glow brighter.
   - If one glow stick is initially brighter than the others, use the experiment you designed to make it glow dimmer.

REQUIRED PHOTO: Includes your face and/or clearly shows a Picture I.D. (with name), showing the glow sticks glowing with different intensities.

4. Remove and activate the remaining three glow sticks from their packaging.

5. Assuming that all three glow with the same intensity, use one of the glow sticks as a standard. Carry out the experiment you designed to cause one stick to glow for a longer period of time and one to glow for a shorter period of time.
    - If one glow stick is initially dimmer than the others, use the experiment you designed to make it glow for the longest period of time.
    - If one glow stick is initially brighter than the others, use the experiment you designed to make it glow for the shortest period of time.

REQUIRED PHOTO: Includes the date clearly shown on a calendar, newspaper, cell phone, or written on a sheet of paper, showing the glow sticks after the first and/or last glow stick has quit glowing.

6. Record all times, temperatures, and observations into two separate **data tables** (not graphs), one for each of the experiments you designed.

Name_____ Lab Section_____

PRELAB QUESTIONS

- Answer each of the following questions about glow sticks **in your own words**.
- Where indicated below, **provide a <u>complete</u> citation** of where the information was found [URL and date accessed; book or periodical – with publication date and page number(s)]

1. What is chemiluminescence?

   Citation:

2. Is the chemical reaction that occurs within a glow stick endothermic or exothermic? Explain.

   Citation:

3. Predict how temperature affects the brightness of the glow stick. State your prediction in the form of a hypothesis.

4. Predict how temperature affects the length of time that the glow stick emits light. State your prediction in the form of a hypothesis.

5. Which safety precautions, if any, must be observed during this lab activity?

ASSIGNMENT

1. **Write a short report** (2 or 3 paragraphs in length) summarizing your results. Address the following items in your report. Since your assignment is to be written in report form, **do not include the questions below in the report**. The questions should not be visible anywhere in the report that is submitted. Except for the data table, the report must be written using **complete sentences**.

    - What were your hypotheses?

    - What did you do to cause a glow stick to glow brighter? What did you do to cause a glow stick to glow dimmer? Were the results what you originally expected? Explain **why** your actual results should make sense, particularly if they were different from your original predictions.

    - What did you do to make a glow stick glow longer? What did you do to make a glow stick glow for a shorter time? Were the results what you originally expected? Explain **why** your actual results should make sense, particularly if they were different from your original predictions.

    - What is the relationship between the brightness of the glow stick and the length of time that they glowed? Explain **why** this should be expected.

2. Include **data tables** (not graphs) that show all of your data and observations.

PHOTOS - Please compress photos and save your file **before** uploading to the dropbox. Photos should come close to filling the boxes below and all required items should be **clearly visible**.

Required Photo 1:
Required Photo 2:

Lab Report Submission Checklist

Complete the appropriate checklist and **submit this page** along with your lab activity.

Lab Activity Submitted Via the D2L Dropbox

	Prelab assignment is complete.	
	Remainder of lab activity is complete (data, questions, photos. etc.).	
	Required photos of the procedure included.	
	At least one photo shows face or photo I.D. At least one photo clearly shows the date.	
	Document filename in format of **Lastname Firstname HX**.	
	File size is no larger than 10 MB.	
	Only one document submitted for this lab activity.	
	Lab submitted on time.	
		If late, this is your first extension.

Lab Activity Submitted Via the US Postal Service or In Person

	Prelab assignment is complete.	
	Remainder of lab activity is complete (data, questions, photos. etc.).	
	Required photos (at least one showing face or photo I.D.; at least one shows the date) of the procedure or a tangible artifact or product from the lab activity is included.	
	If return is desired, a self-addressed stamped envelope **with sufficient postage** is included*.	
	Lab submitted on time (postmarked by due date if sent via USPS).	
		If late, this is your first extension.

*You may find a postage calculator at http://postcalc.usps.gov. Use the balance in your kit to find the weight.