

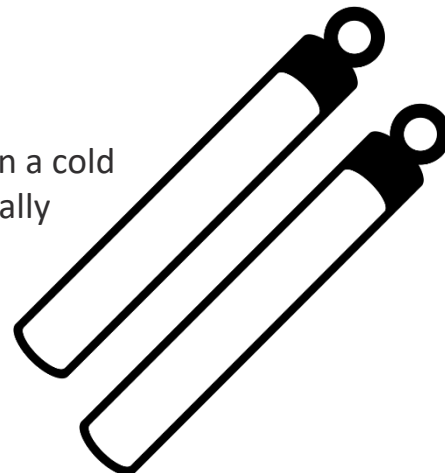
## Slow the Glow

### Student worksheet

Some people say that you should place activated glowsticks in a cold place, like the freezer, to make them last longer. Does this really work? Would it be better to keep the glowstick with you? Do an experiment to find out!

A hypothesis is prediction about what might happen in a scientific experiment. It is based on previous experience and existing knowledge. Circle your hypothesis for the question: Which will glow the longest?

- A. A lit glowstick stored in a cold place will last longer.
- B. A lit glowstick stored in a room temperature place will last longer.
- C. The glow will last the same amount of time no matter where you store a lit glowstick.



### Be safe

- Glowsticks are non-toxic, but they are not food! Keep glowsticks out of the reach of young children and pets.
- Keep glowsticks sealed at all times. Do not cut or heat beyond 110 °F. The chemicals and small pieces of broken glass may leak and irritate or cut skin.
- If a glowstick leaks, dispose of it with the household trash immediately. Wash hands and any area that may have come in contact with the glowstick liquid or broken glass. Clean the area carefully with paper towels and dispose of them with the household trash.
- Used glowsticks may be safely disposed of with the household trash. Keep them intact when placing in the trash.

### What is inside these glowsticks?

Before activating, glowsticks contain two different solutions, which are kept separate inside a sealed plastic tube. Hydrogen peroxide, colored with a fluorescent dye, is typically sealed inside a small glass container. A colorless chemical (phenyl oxalate ester) is outside the glass. Bending the glowstick breaks the glass, allowing the chemicals to mix and react. The light-producing chemical reaction inside these and other glowsticks is called chemiluminescence.

### Question to investigate

Which will glow the longest—a lit glowstick stored in a cold place?  
 Or a lit glowstick stored in a room temperature place?

### You will need

- 2 glowsticks, same type and color
- 2 plastic cups, similar size and shape
- Warm tap water
- A place that is cold
- A place that is a comfortable temperature (room temperature)
- Paper to label one cup *cold glowstick* and the other *room temp glowstick*

### Procedure

1. Half fill 2 similar plastic cups with warm tap water.
2. Put both glowsticks in their labeled cups of warm water at the same time.
3. After 2 minutes, remove both glowsticks and compare their brightness.
4. Record the time and glowstick with the brightest glow in the chart below.
5. Place or return the glowsticks to their cold or room temperature locations.  
 Be careful not mix the glowsticks up!

	Day 1		Day 2	
	Activate both glowsticks	Check the glow in the evening	Check the glow in the morning	Check the glow in the evening
What time is it?				
Which glowstick has the brightest glow?	Same brightness			

Which glowed the longest?

- A. The glowstick stored in a cold place lasted longer.
- B. The glowstick stored in a room temperature place lasted longer.
- C. The glow lasted the same amount of time, no matter the temperature.

How do you recommend storing a lit glowstick when it is not being used?