

Luminol VS Temperature

M7-9 Chemical science



Testable Question & Purpose

Question: Does the temperature of a room change the chemical reaction of luminol.

Purpose: The purpose of this experiment is to help forensics teams better understand what luminol is and what factors change it.

Abstract

You may have seen forensics teams in movies or shows spray the area with a strange liquid, the liquid, when in contact with blood, glows a blue color. If you have seen this, you have seen the work of luminol! Luminol is a substance that has a blue or green glow when it comes in contact with blood, certain metals, or other oxidizing agents. It is made from hydrazine and hydrogen peroxide and exhibits chemiluminescence, the process by which light is emitted from a chemical reaction. Luminol has many uses, but is most widely used for crime scene investigation and forensic science.

Hypothesis

If luminol is placed in both hot and cold temperatures, then the luminol will give a longer, better reaction when placed in the warmer temperatures.

Materials

The materials used in this project were:

- Luminol
- Paper plate
- ◆ Digital camera that can take pictures in dim light (should allow for long exposures; for example, 5 sec)
- Tripod
- Lab notebook
- Ice Styrofoam™ cups
- 12-oz (2) Liquid measuring cups
- 1/3-cup capacity (2)
- Kitchen thermometer Helper
- Metal spoons (2)
- Stopwatch or timer

Procedures

-Add 1/3 cup of ice-cold water to a Styrofoam cup.

Add 1/3 cup of hot tap water (about 50°C) to a second Styrofoam cup.

Determine the temperature of the water in each Styrofoam cup and record it in your lab notebook.

Now add the cold water to one of the plastic cups containing the luminol, perborate, and copper sulfate.

Add the hot water to the other plastic cup.

Have your helper pour water into one of the containers so that the reactions start at the exact same time.

You and your helper should each mix a solution with a clean spoon.

Start the stopwatch or timer.

Dim the lights and observe the light produced by each cup.

Take a picture of the two cups.

Record the time on the stopwatch or timer at which the picture was taken.

Continue taking pictures, recording the time at which each picture is taken.

The number you take will depend on the length of the exposure.

It is important not to vary the conditions for the pictures once you have settled on an exposure time that works well.

A good exposure time should give you a clear picture of the two cups so you can compare their brightness.

You will want to compare all of the pictures later, so the conditions should be as consistent as possible.

Repeat steps with clean and fresh materials.

Be sure to use the same starting temperatures of the water.

Take pictures at the same time intervals for each trial and using the same exposure length every time.

Variables

Independent-

Temperatures

Amount of Copper Sulfate Crystals

Controlled-

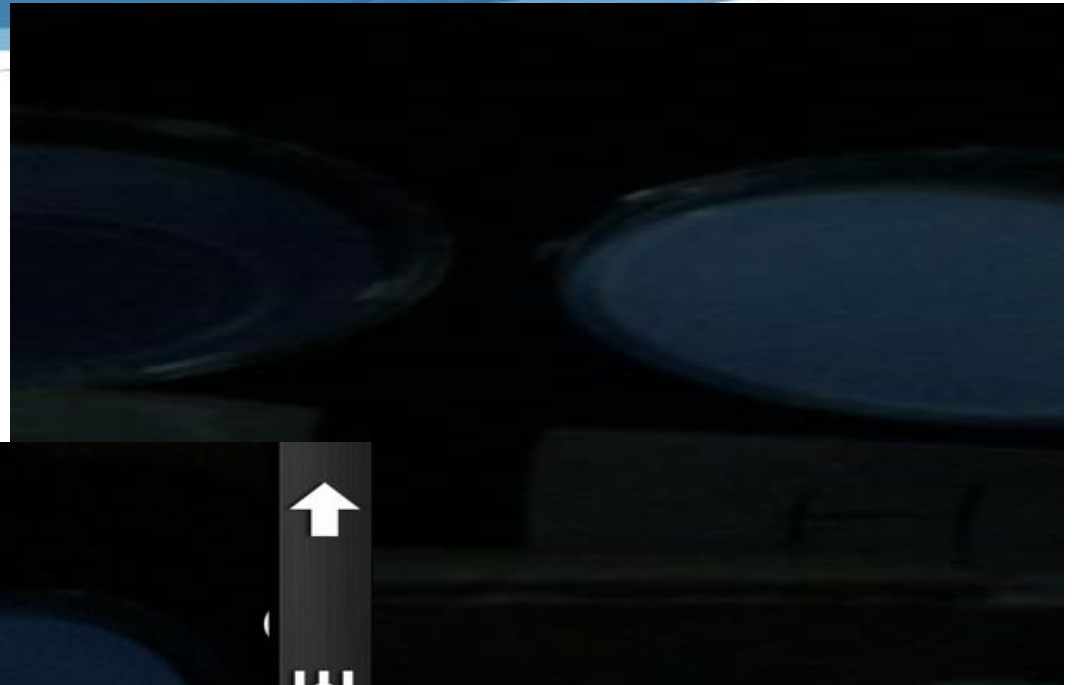
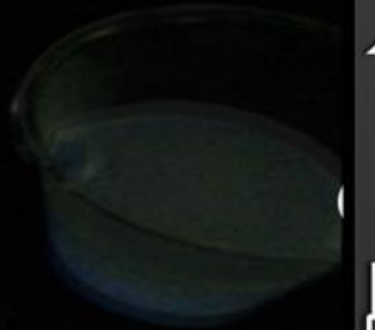
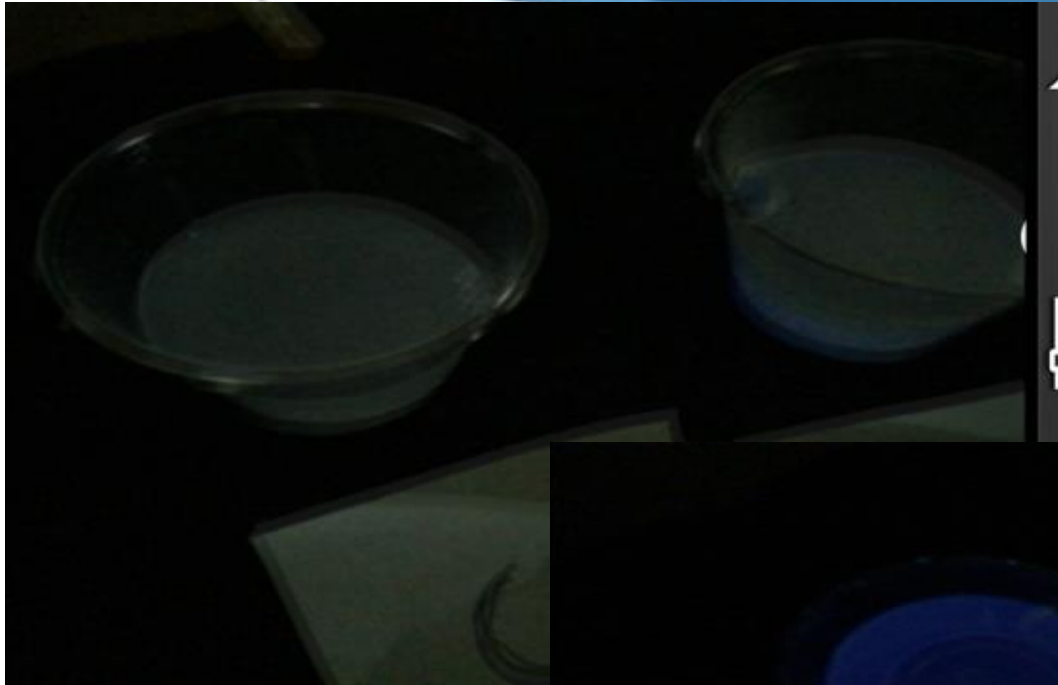
Temperature

Brightness of the room

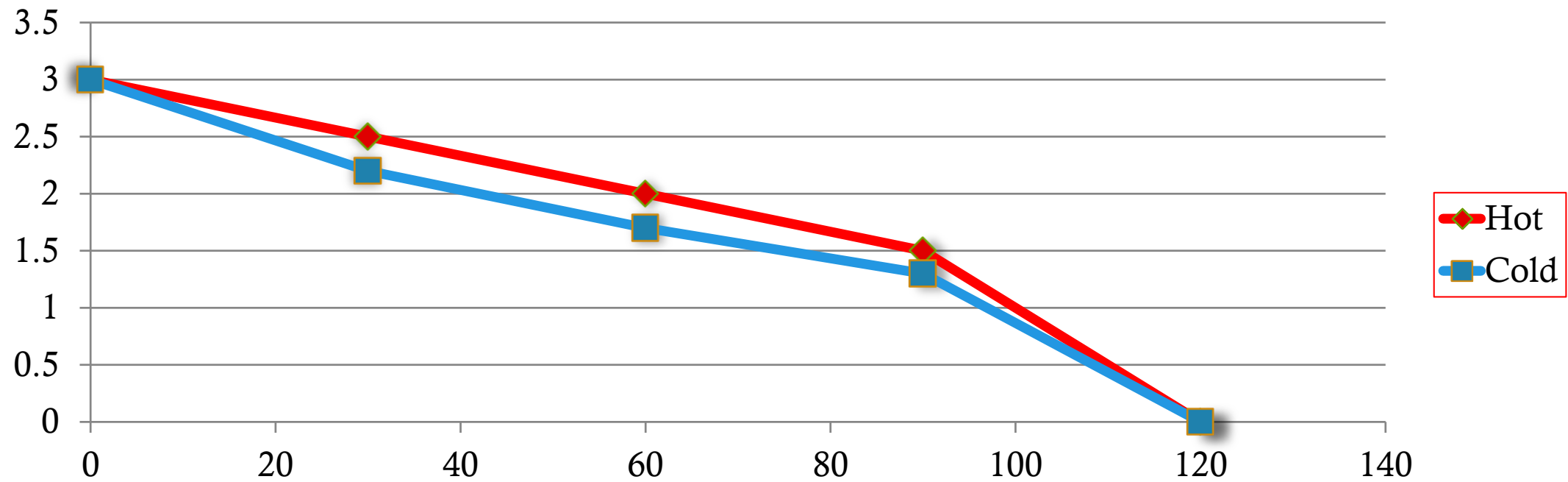
Dependent-

Reaction of luminol at different times with different temperatures.

Pictures



Results (Graph)



Results

The data showed that the warmer temperature affects the luminol more. The luminol in warmer temperatures had a longer lasting reaction time and a different reaction than the colder temperatures.

Conclusion

My hypothesis was supported because the warmer temperature did in fact affect the lumniol more. The data showed it had a longer reaction time and a different reaction and color.

Sites Noted

“Luminol”

<https://www.chemistryworld.com/podcasts/luminol/7272.article>

“Luminol (Blood)”

<https://dps.mn.gov/divisions/bca/bca-divisions/forensic-science/Pages/forensic-programs-crime-scene-luminol.aspx>

“How Luminol Works”

<http://science.howstuffworks.com/luminol.htm>

“Luminol and the Crime Scene”

<http://www.crime-scene-investigator.net/luminol-and-the-crime-scene-8-91.pdf>

“Luminol; Trick-or-Treat or Terrible Feat”

<http://www.scienceiq.com/Facts/Luminol.cfm>