

## Teacher Notes-“Science Christmas Show”

Christmastime is here. So on the last day before Christmas break, instead of throwing a puzzle at your students or putting on a video, why not celebrate by turning one of the most chaotic days of the school year into one of the most memorable? The *Science Christmas Show* combines the magic of Christmas with the magic of Science. Have fun with this- think of it as your gift to your students.

Most of the demonstrations that follow were chosen because they could be colored red and green in some way. Knowing that’s all a demo needs to qualify, you might even come up with some of your own to include. Good luck, and merry Christmas!

### **Basic Materials: Besides what listed for each demo, you’ll also need...**

- 1 copy of “The Physics of Santa Claus”- search the internet for “the Physics of Santa Claus”. It a hilarious 5 point argument that scientifically examines if Santa Claus could possibly exist.
- Mop and extra towels for water spills.
- Christmas music to play while you’re doing the demonstrations. You won’t be speaking. All your students will hear is the Christmas music playing during the show.
- A Christmas puzzle, like a word search- to keep students busy the last 15 minutes while you clean up the mess and get ready for the next class.
- Goggles! Put them on at the beginning of the show and take them off at the very end. A lab coat/apron is a good idea also.
- Review where all your fire safety equipment is and know how it all works.

### **A Quick Overview:**

1. (5 min.) Welcome students to your room with Christmas music playing. Make sure everything is set up.
2. (10 min.) Read “The Physics of Santa Claus”. In point 2 of it you might to skip over the line about Muslim, Hindu, Jewish and Buddhist children. Not really necessary.
3. (15-20 min.) Do the Christmas demonstrations while Christmas music plays (without you talking).
4. (15 min.) Give students a puzzle to do while you clean up and reset for next class. Student helpers will make clean up go quicker.

## **Materials and Procedure for each demonstration**

---

### 🎄 1. Christmas Glow Show

- 1 gram- [Cupric \(copper\) Chloride, Dihydrate](#) (item # WW97161M02 at [sciencekit.com](#))
- 1 gram- [Strontium Chloride](#) (item # WW94365M04 at [sciencekit.com](#))
- 1-50 mL beaker with water
- 2-metal spatulas
- 1-pair goggles
- 1 Bunsen burner
- 1-sparker for burner
- 1-paper plate



**Setting up:** Sprinkle some of the cupric chloride and strontium chloride in separate piles onto the paper plate. A little goes a long way!

**Procedure:** Put on goggles. Turn off all lights in your room and close blinds. Light the Bunsen burner. Put the ends of each spatula in water and then roll them around on the salts (Cupric and Strontium Chloride) so the crystals stick. Slowly begin burning the salts, first with a little dazzle of one color near the top of the flame, then with the other color, and finally immersing both spatulas in the middle of the flame for a full force display of bright red (strontium) and green (cupric chloride). Use the water to cool the spatulas and pick up more salts. Turn burner off when done.



*Caution: Copper chloride and strontium chloride both are irritating to eyes- wear goggles! Keep flammables, loose clothing, hair, and your hands away from the flame. Locate all fire safety equipment and be familiar with their operating procedure BEFORE attempting this. Comply with the fire codes in your building. Shut off the burner as soon as the demo is over.*

## 🌟 2. Christmas Eve Meteor Shower

1-250 mL beaker: 2/3 full of water; put in a little liquid dish soap and a couple of drops of glycerin

1-Erlenmeyer filter flask (with side discharge)

1-piece of flexible tubing- about a foot long

1-stopper for the flask

[Zinc](#) metal-(item # WW94390M06 at [sciencekit.com](#))

1.0 molar [hydrochloric acid](#)

1-lighter-with clicker



**Setting up:** Mix the water, soap, and glycerin in the beaker. Any liquid dish soap will work, but Ivory is clear which allows you to add red or green coloring to the water if desired. Put 10 grams of zinc into the Erlenmeyer filter flask. Attach the flexible tubing to the side discharge and submerge the other end into the water mixture.

**Procedure:** With lights still off and blinds still closed, add hydrochloric acid to the Erlenmeyer with zinc and stopper it shut. Within a few seconds hydrogen gas will begin forming and will create bubbles (full of hydrogen gas) in the beaker. As bubbles begin to pile up, bring a lit lighter up to them and watch the bright flashes of light!



This will run continuously for a little while, so keep coming back and setting the excess bubbles aflame. Don't let too many bubbles pile up- you don't want to get the plastic tubing burning.

*Caution: Wear goggles. Hydrochloric acid is very hazardous to eyes and skin. Immediately rinse it off any skin that's been exposed to it.*

### 🌲 3. Rudolph's Flip Flop

- 1-red balloon
- 1-green balloon
- 2- 250 mL Erlenmeyer flasks
- 1-hot plate



**Setting up:** Put about 100 mL of water in each flask. You can also color the water red and green if you like. Set them on a hot plate at 300° Celsius 20 minutes prior to class. *Caution: Never leave hot plate unattended. Turn off the hot plate as soon as you are finished with it.*

Set out a red and green balloon.

**Procedure:** After the water in the flasks has been steaming at least 5 minutes (so all the air inside is pushed out, which will later create a vacuum), stretch the mouth of a balloon over the mouth of each flask. Use caution when doing this so you don't burn your fingers. Try using your second and third fingers from both hands together to hold open the balloon's mouth then quickly snap the balloon on the flask. Practice this on a room temperature beaker a few times.



After watching them inflate with steam and grow for a minute, take one of them off the hot plate. It will shrink as everyone thought it would. But then something else will happen. After you walk away from it and move on to the next demonstration the balloon will get pulled inside of the flask, turning completely inside out. You can make the balloon withdraw even quicker by putting the flask into an ice bath.



**Note:** After about 10 minutes you might get a nice surprise if you leave the flasks cooling on a tabletop. As the balloons strain more and more under the air pressure they will finally burst, giving a nice wake-up POW! to students sitting near it. Make sure no student is sitting *right next* to it, as it can be quite loud.



#### 🎄 4. Santa's Magic Dust

- 1-red balloon
- 1-green balloon
- 1-candle
- 1-lighter or matches
- 1-250 mL beaker of water
- 1-Santa hat or Santa doll



**Procedure:** Light the candle. Blow up one of the balloons and slowly bring towards the flame until it pops. (Wouldn't glitter or confetti inside make it prettier?) Now pour some water (~20 mL) inside the other balloon and blow it up. Take the Santa hat and wave it magically over the balloon. Hold it over the flame *for a few seconds* while everyone flinches. Show students the burn mark left on the un-popped balloon.

*As with the Glow Show demo, use caution with the lighter and candle. Keep the lighter away from students. Keep loose clothing and hair away from the flame, and blow out the candle as soon as the demo is completed.*



## 🎄 5. Santa's Sleigh

6 (or more)- 35mm film canisters (item #CAN-300 at [teachersource.com](http://teachersource.com) )

### Baking soda

1-spoon

1- 250 mL beaker with some [vinegar](#)

1-dropper

1 (or more)- towel

Pictures of Santa on his sleigh to decorate the canisters



**Setting Up:** Put about half of a plastic spoon of baking soda inside each canister. You don't have to be exact here, just "some". Pour vinegar into the beaker and write "vinegar" on it with a masking tape tag so you don't confuse it with the other beakers of water lying around. Leave the dropper inside the beaker.

**Procedure:** Pull the cap from the canister off so it just "peeks" open, insert the dropper full of vinegar, squirt it in, and quickly snap it shut. Set it lid-side down on the table and stand back! Don't put a loaded canister beneath a light fixture or anything else you could damage in your ceiling.



**Notes:** This demonstration is most fun when done right in front of students. You might hand out the canisters at the very beginning of the show to random students all over the room for them to hold onto until later when you come back and set it off on their table.

You will need a bunch of the old 35mm film canisters. If you don't have any, call photo shops around town and ask for some or see the website linked to in the materials list. The opaque canisters (made by Fuji) work better than the black ones because their lids snap tighter, which allows more pressure to build before they pop. But if all you can get is black, those will work too.

Try to get enough canisters so you can pre-pour all the baking soda you'll need for all your classes. Reasons you'll want to do this- 1.) You won't have enough time to wash and reset them in between classes, nor will you want to 2.) a washed canister will make the fresh baking soda wet for the next class, which makes it not react as well (some won't pop), and 3.) the residual baking soda grit around the cap causes it to not hold as tight, diminishing the pop.

Decorate the film canisters with pictures of Santa's sleigh that are scotch taped to the canisters. Search the clipart in your word processing program for "sleigh". If you don't like the selection, search the internet. Insert and reduce its size down to just under 2



inches. Then copy and paste it multiple times in the same document, and print on photo paper (which can tolerate a little water). Cut them out and scotch tape them on each canister. Cover them with more scotch tape so water can't get in as easily.

The spray coming from the bottom of the canister is messy but harmless, but you should still not set it closer than 2 feet from any student so there's no chance of them getting anything in their eyes or on their clothes.

---

## 🌲 6. Reindeer Toothpaste

2- 100 mL graduated cylinders

[Hydrogen Peroxide](#)- 30% laboratory grade is preferable, 3% store grade will also work (but slower)- item #WW98048M06 at [sciencekit.com](http://sciencekit.com)

[Potassium Iodide](#) (KI)- item #WW94230M02 at [sciencekit.com](http://sciencekit.com)

Liquid dish soap (Ivory is clear, which will not interfere with the red and green coloring)

Stirring rod

Red and green food coloring

A trash bag or a clear box to do this messy demo on or in



**Setting up:** Place the cylinders on a trash bag or in a clear box. Pour 50 mL of peroxide into each graduated cylinder. Add in a little liquid dish soap. Put in a *generous* amount of red coloring into one cylinder and some green into the other. Stir.



**Procedure:** Pour 4 grams of potassium iodide into each cylinder and stand back.

*Caution: Avoid all contact with potassium iodide and the 30% laboratory grade of H<sub>2</sub>O<sub>2</sub>.*

## 🌲 7. Inverted Fountain Of Belief

- 2- 250 mL Erlenmeyer (or Florence) flasks
- 2- 400 mL beakers full of red and green colored water
- 1-single hole stopper
- 6 inches- flexible tubing
- 1-rigid plastic or glass tubing
- 1-hot plate
- 1-hot glove
- 1-ring (from a ring stand) used to hold the boiling flask upside down



**Making the tube, stopper, and hose assembly:** Push and twist the rigid plastic or glass tubing through the hole in the stopper. Soapy water helps it slip through easier, and if it's glass then cover your hand with a towel in case it breaks, and so you get a better grip too. Slip the flexible tubing/hose over the end of the tube that's on the top side.



**Setting up:** Put about 100 mL of water in the 2 flasks and set them on a hot plate at 300° Celsius for 20 minutes. These flasks can share the same hot plate as the ones used in Rudolph's Flip-Flop. *Use the same caution: keep an eye on evaporating liquids, turn off hot plates as soon as you're done, and for this demo- use a hot glove to handle to flask.*

**Procedure:** After the flasks have been steaming at least 5 minutes, insert the stopper. Then, with a hand protected by a hot glove, grab the hot flask and turn it upside down and slip it through the ring. Immediately put the end of the flexible tubing into one of the beakers of colored water. After about 10 seconds the water begins to fill inside the flask using water from the beaker. Take the first one for a walk around one side of the room for students to see. Use the other flask to show the other students.

**Note:** Put a little masking tape label on the tube/stopper assembly so you don't forget what this is for and take it apart. See a close-up picture of the assembly in the picture bank.



## 🎄 8. Crazy Christmas Bottles

4-Erlenmeyer flasks, 250 mL (all being the same size); small plastic soda bottles would also work  
2-index cards  
1-hot plate  
red and green coloring  
signs- 2 that say “warm” and 2 “cold”  
ice or refrigerator



**Setting up:** Fill all 4 flasks with water. Color the water in 2 of the flasks red and the other 2 green. Put a red and green flask on a hot plate set to 100° Celsius and the other red and green on ice or in a fridge. Tape the “hot” and “cold” signs to each flask, so the students will be able to read them and figure out what is causing one set of beakers to mix and the others not to (since you won’t be talking). Think ahead to which flask will be where so you know which ones to tape upside-down. Stick little masking tape labels on each flask that say “1-top, hot red”, “1-bottom, cold green”, “2-top, cold red”, “2-bottom, hot green” so you won’t forget.



**Procedure:** First, balance a hot red flask on top of a cold green one mouth-to-mouth. To do this- hold an index card over the mouth of the warm red while you turn it over to keep the water from spilling. Stack them, adjust so both mouths come together perfectly, then carefully slide out the index card. The colors here will not mix because the temperatures are already where they want to be.

In the second setup, do the reverse. Put the cold red on top of the warm green. They will mix because both temperatures are in the wrong place.

*In this demo, there is a risk of the top flask falling, in which case there could be some broken glass. Do not allow students to try to help pick up the pieces.*

---

### **Beforehand: Things to do and to be aware of...**

1. As soon as you’ve made the decision to do this Christmas show, take the time to try out each demo. You’ll need the practice and insights you’ll pick up from the experience.
2. The day before the show, set out all materials.
3. Think about safety all throughout this show. Make it a fun and memorable event for everyone. And as unlikely as an accident may be, you must always assume

something could go wrong, so plan for it. You've noticed "Cautions" throughout this document- please take them seriously.

4. Close the blinds in your room in preparation for the first 2 demos.
5. You'll probably have (and need!) around 15 minutes left over after the show to prep for next class. The things on the "Day Before/Of Checklist" marked with an asterisk are items you should set out enough of to last you through all your classes throughout the day.
6. Get your Christmas music ready. Have it long enough that it plays after you're done and they have something to listen to while doing the puzzle.

***MERRY CHRISTMAS!***

Come back and visit [InteractiveScienceTeacher.com](http://InteractiveScienceTeacher.com) for more great Interactive Science Lessons.