Science of Magical Parties



ENGLISH SCRIPT

Portable Science Show for Kids
Age: 4-7 years old
Duration: 30 minutes

Preparation

Material:

- Liquid nitrogen
- Small Dewar
- Safety barriers: 4 cones and safety strip
- Tablecloth
- Book
- Adhesive tape for hanging garlands
- Banner made of triangle indicator paper (9 triangles: 3 for each liquid)
- Big beaker with water
- Small beaker with water and citric acid
- Small beaker with water and sodium carbonate
- Paintbrushes (x3)
- Safety gloves (x1) and goggles (x2)
- String
- Balloons: round ones, long ones, giveaway ones (Science Gateway)
- Pump
- Large plastic tweezers
- Large wooden/plastic spoon
- Bottle and caps (x2)
- Bucket with water
- LED lights (if needed: extension cord, plug adapter)

Organizers:

- Ventilated or outdoor space (liquid nitrogen use authorization)
- Table
- Speakers for playing music at the end
- Outlet to plug in the lights
- Space large enough to establish a security perimeter of about 2m around the table
- An assistant
- Someone to introduce the show [see intro p.5]

Setting up the stage:

- Install the safety barriers
- Prepare the table with the tablecloth and all the equipment
- Pouring liquid nitrogen into the small Dewar
- Inflate the balloons, tie them with the string and hide the garland in the small Dewar
- Prepare the solutions in 100 ml of water:
    - Citric acid: 20 g
    - Sodium carbonate: 5 g
- Inflate a long balloon (or do it in front of the audience)

Overview

Paper banner	**Page 1: Party recipe, Page 7: Decorations, Page 10: Banners** **Story:** This banner can be used. But all the triangles have the same color! We're going to repaint it with these three transparent liquids **Explanation:** These triangles are made of a special paper that changes color depending on the liquid you put on them: water, citric acid, sodium carbonate **Secret: It's not magic; it's science!**
Balloons	⚠ **If a balloon bursts, you should burst out laughing!** **Story:** It's hard to inflate these balloons! Trick to go faster. **Cauldron with two strings and a volunteer,** ⚠ **Safety glasses**
Long Balloon	**Experiment to understand how balloons inflate, Liquid Nitrogen** **Experiment:** Dipping a long balloon back into nitrogen and taking it out again **The balloon was already inflated and the cold/hot air takes up less/more space**
Drinks	**Story:** Here is a large container with water, but it's a bit lukewarm. I'm going to cool it down with liquid nitrogen. *What do you think will happen?* **Explanation:** When liquid nitrogen is poured into the water, it cools down and turns into ice.
Bottle and caps	**Story:** It's time to put the nitrogen in this bottle and close it **Explanation:** When it warms up, liquid nitrogen takes up more space and pushes against the cap. That's why the cap pops!
Dance floor	**Story:** We are missing the dance floor! We're going to make another cloud, just like before, but in this big bucket. We turn on these lights and add some liquid nitrogen. We play some music, and everyone gets up to dance! But don't forget to stay outside the safety zone!

Intro organizers

Instructions: *During the show, you must stay in this area and not come on the stage.*

Story: *This is the story of a scientist named [name]. After doing extensive research at CERN, he/she has finally unlocked the secret of organizing fantastic scientific parties. [Name] is absolutely delighted and has decided to come and share this discovery with the children [of the Jardin des Particules, etc].*

Do you know the children [of the Jardin des Particules]?

Intro guide

Hello kids! My name is [name], and today I need your help! Can you help me, please, please, please?

I promised my friends that I would throw a magical party today, but it completely escaped my mind until now! And I don't even have magic powers, but I think we can easily solve this together, with your help! Would you help me organize a magical party?

[Yes !]

Great, thank you all! Well, when I organize a party, I always use this book called: Science of Magical Parties...

Find the book and open it

Here it is. On the first page, we can find the recipe for nice parties.

To cook up a nice party, we need these ingredients:

- **decorations**,
- **drinks**, **and**
- **a dance floor**!

Then, let's start with the decorations... So... **Page 7 - Decorations.**

Read

For parties, the most important decorations are banners and balloons.

Ah, we could use this paper banner we have here! But all triangles have the same color! Do you prefer a dull banner or a colorful one?

[Colorful !]

I knew you would say that! So we are going to repaint it. To do that, we should go back to the decorations page... Page 10... Here it is - the banners. OK, for this, we need to find:

- **a paper banner**
- **three glasses of magic water**.

For a large audience with young children, to avoid chaos, do the demonstration alone or with an adult as your assistant. ***For a smaller audience or with older children, do it with some volunteers***

We bring all of that here. Now, we need three volunteers!

[Volunteer, name, applause...]

Now, we're each going to paint one triangle of the paper banner with one of these three colors – transparent, transparent and... transparent. Here, we have three different containers. So now, what do you think will happen when we paint the paper banner with these transparent liquids?

[Nothing!]

Hmm, I myself don't know, and the book doesn't say what should happen. I guess we have to try. Are you ready?

[Yes !]

OK, so let's put each brush in its container and use them to paint a few lines on the triangles... Look! What happened?

[The colors change!]

Wow, you are right! It's incredible! Hmm, it would seem magical but... Was it really magic?

Search in the book

AHA! It says here below:

Secret: Even though it looks like it, this is not magic – it's science.

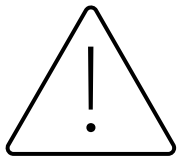
So you're not magicians, you're scientists – and that's so much better!

The triangles of this banner are made of a special paper that changes color depending on the liquid you put on them. For the experts: The paper is an acidity indicator, and we have three liquids that interact with this indicator paper in different ways. The first beaker contains tap water. In the second one, I had added a little bit of citric acid, like the one you find in lemon juice. In the third one, I had added a little bit of sodium carbonate, like the one you find in baking powder.

Now we have our colorful banner, but we also wanted to have balloons! Who likes balloons?

[Me!]

Perfect! So... Here, it is written:



When handling balloons, remember that sometimes they pop!
If a large balloon bursts, you should burst out laughing, very loudly: HAHAHA!
And if a small balloon bursts, you should burst out laughing, but very softly: hihihi!
That way, the magic won't escape.

That's great advice! So, the first thing to do is inflate the balloons!

***Try to inflate a balloon**. If it works, pretend to be out of breath right afterwards.*

Like this or more?

[More!]

With the small balloons, it's actually very difficult: try again, joke around a little.

Oh my! It's difficult! I'll look in the book if there are any tricks to go faster

Turning the page

AH! This is where that happens! Okay.

You need:

- **a small cauldron with two strings... and**
- **an adult to help you.**

Ah, I need an adult to help me. Is there anyone who likes it when balloons burst?

[Volunteer, name, applause...]

[Volunteer], you are very brave! Now the book says:



"This experiment can be dangerous,
so you should wear safety goggles."

Safety is very important. So, let's get ready...

Prepare yourself and the volunteer with safety goggles

Now that we have our goggles, we're going to hold one of the strings each and we're going to slowly move away from the cauldron. Everyone else, you should observe what happens. OK, [volunteer], are we ready?

[Yes !]

What about you? Are you ready?

[Yes !]

Take a good look at what happens. Let's go!

Take out the balloons to obtain a chain of about 10 balloons

Wow! What do we see?

[The balloons inflate on their own!]

Yes! The balloons inflate on their own! Again, we would think this looks like magic! [Volunteer], are you a magician?

[No!]

Me neither! So it's even more impressive that we managed to do this magic trick! Thank you, [volunteer], you can go back to your seat. Let's have a round of applause!

[Applause...]

But how does this work? The book says that we can do an experiment to understand it

For the experiment to understand how the balloons inflate on their own, you need:

- **an inflated balloon and**
- **a magic pot.**

Okay, I've got a long balloon here. I can inflate it!

Inflate the long balloon with the pump to show that it is a normal balloon filled with air

And then?

We put the balloon inside the magic pot.
The magic pot is actually filled with a very very very very very cold liquid, called liquid nitrogen.

Have you ever heard of liquid nitrogen?

[No! Yes!]

What is liquid nitrogen? The book says that

**Liquid nitrogen is such a cold liquid that if you dip (almost) anything in it,
it cools down right away.**

It's a liquid that's even colder than the freezer at home.

So, we gently put the balloon in the liquid nitrogen and take a good look at what happens.

Put the long balloon in the liquid nitrogen

What do we see?

[The balloon is smaller]

Yes! The balloon is smaller, it shrinks. After a while, it seems like the balloon is almost gone. The book tells us that

**The balloon shrinks because liquid nitrogen is very, very, very, very... very cold!
And when you put the balloon in liquid nitrogen,
the air inside the balloon doesn't need as much space.**

Now we take the ball out and see what happens

Remove the balloon

What do we see now?

[The balloon inflates]

Oh yes, the balloon is inflated again! In the book, it says that

**The balloon inflates because the air inside the balloon needs
less space when it's cold and more space when it's hot.**

It's incredible and almost magical! We have amazing decorations, with these balloons!

Hmm, do we need anything else? Oh yes, we still need some drinks... So, I've got this big container with water here, but it's a little lukewarm. I'm going to cool it down with the liquid nitrogen. What do you think will happen?

Pour liquid nitrogen into the container with water

When liquid nitrogen is poured over the water, the humidity in the air turns into this big cloud above the container. But you can't chill drinks with a cloud! Have we formed anything else?

After a little while, take out pieces of ice

Ah, yes! When the water cools down enough, it turns into ice. And this we can use to cool down our drinks. Great!

Now, it's time to put away the nitrogen. I'm going to pour a little bit in this bottle and then close it.

Put a little liquid nitrogen in the bottle, then close it with the cap. The cap will pop after a few seconds. Try again once or twice.

But why can't I close the bottle? Well, when it warms up, the nitrogen takes up more space. After a very short time, the nitrogen no longer has enough room and it pushes against the cap. That's why the cap pops!

So, we are not going to put away the nitrogen in the bottle. In fact, we are still missing one of the elements for a nice party: the dance floor! We are going to use the liquid nitrogen to make a cloud like before, but now in this big bucket with water.

Tidy up the stage such that there is a safe space for children to dance. Put the bucket with water right in front of the table

We also turn on some lights, colorful like a rainbow...

Install the color LEDs

And, finally, we add some liquid nitrogen

Pour some liquid nitrogen into the bucket to create a large cloud

Now, I think we're ready for the party! Thank you very much, children, for helping me prepare everything, the party will be wonderful! Let’s play some music, and then everyone should get up and dance! But don't forget to stay outside this zone!

Play some music. Invite the children to dance (without entering the safety perimeter)

[Applause...]

Thank you very much!