

SMART CHELI

STEM challenge #04

The Invisible Message

Age: 9-13years

Time: 30-45 min

STEM Areas: Chemistry + Science

Difficulty: ★★☆☆☆

Internet needed: No

Mina loved solving mysteries. She enjoyed looking for clues that other people couldn't see and often wondered how scientists could discover things that were invisible to the human eye.

One day, her teacher gave the class a challenge. On the table were a sheet of paper, a cotton bud, baking soda, turmeric, and a few cups of water.

"Today, you are going to send a message that nobody can see," her teacher said.

Mina looked at the blank sheet of paper. "But if nobody can see the message, how will they know it's there?"

Her teacher smiled. "That's the mystery you have to solve."

Mina wondered if there was a way to make an invisible message appear without drawing over it with a pen or pencil.

She had one big question:

Can I create a hidden message and reveal it using a natural indicator?



Let's, write a
secret message



How should I
write it?



SPOT THE PROBLEM

What does Mina want to do?

How could she make a message that cannot be seen at first?

What do you think could make the hidden message appear?



1. EXPLORE

Before you create your secret message, think about the materials.

Look at the baking soda and turmeric.



Don't worry about being right. Scientists make predictions and then test them!



Think about it:

1. What do you think will happen when baking soda is mixed with water?
2. What happens when turmeric is mixed with water?
3. Do you think turmeric will look the same everywhere on the paper?
4. What might happen when turmeric comes into contact with baking soda?

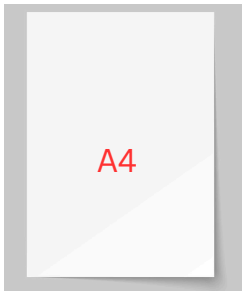


Make your prediction

I think the hidden message will appear when:



2. WHAT YOU'LL NEED



A4 size paper



hand sanitizer



Turmeric (besar powder)



2 paper cups



Cotton bud



Baking soda



You don't always need special laboratory equipment to explore science.



Look around your home — what everyday materials could help you investigate a science question?



3. IMAGINE

Before you begin, become a secret-message designer!

What will your message look like?



What will you hide?

Think of a short message, word, symbol, or drawing.



Think about:

- What message will you create?
- What might make a message invisible on paper?
- What do you think could reveal a hidden message?
- What do you think turmeric has to do with revealing the message?



4. CREATE

Follow the steps in order. go slowly and watch carefully.

Step 1 – Prepare the baking soda solution

Mix 1 teaspoon of baking soda with 8–9 tablespoons of water in a paper cup. Stir well.



Step 2 – Write your secret message



- Dip a cotton bud into the baking soda solution.
- Use it to write a message or draw a picture on the A4 paper.
- Let the paper dry completely.
- Once it dries, the message should become invisible.

Step 3 – Prepare the turmeric indicator

- Mix 1 teaspoon of turmeric powder with a little water in another cup.
- Make a thin turmeric solution or paste.





Step 4: Reveal the message



- Gently spread or brush the turmeric mixture over the paper.

Watch carefully !



- The areas where the baking soda was applied should turn reddish-brown, revealing your hidden message.

Woah! This is magic! Now I can send secret messages to anyone without a single pen, and nobody will ever know!





5. TEST IT !



Scientists don't just perform an experiment once
They observe carefully and ask questions.

What happened?

Did your hidden message appear?

☐ Yes

☐ No

What color did the hidden message become?



ANSWER

What color was the rest of the paper?



ANSWER



Did anything surprise you?



ANSWER

Think like a scientist !

Why do you think only certain parts of the paper changed color?



ANSWER



6. WHAT'S THE SCIENCE ?



- Some substances help us identify the chemical properties of other substances. These are called indicators.
- In this experiment, turmeric acts as a natural pH indicator. It helps us investigate substances that we cannot identify just by looking at them.
- Think about it: Where might people use indicators in everyday life?



Turmeric

Turmeric contains a natural compound called curcumin. It is normally yellow, but when it reacts with a base, it turns reddish-brown.



Baking Soda

Baking soda is a base. When you write with baking soda solution and let it dry, the writing becomes invisible. When turmeric solution is brushed over the paper, the hidden writing turns reddish-brown.

What did you observe?

- Plain paper → stays yellow
- Baking soda areas → turn reddish-brown

This allows us to reveal something that was invisible before.



7. STEM AROUND US

Indicators are useful because they help us investigate the properties of substances that we cannot identify just by looking at them. A simple color change can give us clues about what a substance is like.

Think about places where people might need to find out the properties of a substance. What could an indicator help them discover?

Can you think of four situations where an indicator could be useful?

1. _____
2. _____
3. _____
4. _____

Ah! Imagine where an indicator could come in handy-like testing the pH of soil or liquid!

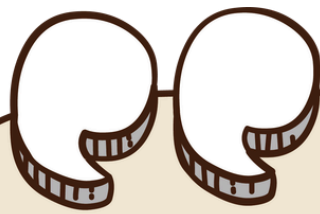




8. My STEM Discovery

One thing I discovered today:

One thing I am proud of:



REMEMBER

message was invisible, but that didn't mean it wasn't there.

Scientists often use indicators to reveal changes that cannot be seen easily.

Every time you ask questions, make predictions, experiment, observe, and discover, you are thinking like a scientist.

