

How to Encrypt & Decrypt Secret Message Using Invisible Ink

Kantamsetti Sushma

Assistant Professor, Pydah group of Institutions, Kakinada, AP, India

DOI: <https://doi.org/10.51584/IJRIAS.2025.100900035>

Received: 08 September 2025; Accepted: 14 September 2025; Published: 12 October 2025

ABSTRACT

Secret writings are invisible writings that can be only seen after using any development technique which helps in revealing those hidden messages. Secret writings is being used since the middle of the 20th century for hidden messages. Secret writing was a source of communication for Prisoner's. Invisible inks like biological fluids, vegetable juices, fruit juices can be used to write the hidden messages. These messages becomes visible when exposed to UV light and heat. In current research paper I had used 40 samples for both heat and UV. The secret message is written using Milk, Onion Juice, Urine and Soap water. These samples are subjected to heat and UV light every day till the last 20th day to decipher the secret message. The conclusion of the experiment is that the Heat method is the best method for deciphering the secret message.

Keywords: Invisible Ink, Secret Writing, Conceal, Decipher, Expose

INTRODUCTION

Invisible inks are used for secret writings. These are fluids used to write hidden messages that do not appear unless exposed by a revealing process. Invisible inks can be classified into 3 main categories – those that are revealed by heat, those that are revealed by chemical reactions, those that are visible under ultraviolet light. Some common household invisible inks are diluted fruit juices, vinegar and laundry detergent, all which can be applied by a paintbrush, special invisible ink pen or even a toothpick. The chemical processes of invisible inks are well known, so a variety of detection methods exist.

Secret writing is any means of written communication whereby a spy conceals the actual written text, whether it is enciphered or encoded or not. Codes and ciphers are sometimes mistakenly placed under the heading of “secret writing”, but this is accurate only if that expression is taken in its most general sense, as writings that are concealed in anyway. Whereas codes and ciphers conceal the meaning of a message, secret writing conceals the actual message.

The nature of the ink varies tremendously. It may be simple substances like water, body secretions, fruit juice, soap etc. On the other hand, they may be highly complex chemicals. These fluids alter the fibers of the paper and when exposed to heat at lower temperature, the secret writing turns brown faster than the surrounding paper. Invisible ink is one form of steganography i.e, concealing a message.

The experiment of secret writing comprises of dipping a paint brush in invisible ink and writing on a piece of blank white paper. At the point when the “ink” dries, it will be undetectable to the bare eye, however in the event that the paper is held up to a direct warmth source, for example, a light, a radiator or an iron utilizing UV light to disentangling imperceptible composition.

Historically, invisible inks were utilized as a part of times of war by governments and extremists alike. The utilization of secret writing has declined since the middle of the 20th century for some reasons, most critical of which is the sheer volume information that knowledge administrations must transmit and process.

MATERIALS AND METHODS

For conducting this research, writing samples like Milk, Onion juice, Soap water and Urine are used. Blank white papers were used for writing samples. These papers are normal rough papers having 70-80gms of gsm (grams per square meter) and 5cm in size. The instrument used to write secret message is a cotton bud.

Dip the cotton bud in a sample and write the secret message (0,1,2,#) using sample on a blank white paper. Allow it to dry at room temperature. The secret message disappears as it dries.

There are two methods to decode the hidden message –

1. Heat
2. UV light

This research is conducted in 20days. So, 40 samples are prepared using above mentioned inks. 20 samples are used for decoding the message using heat method and other 20 samples are used for decoding the hidden message using UV light.

Heat Method –

Ignite the candle using matchstick. The paper is placed on top of the candle. Move the paper slowly horizontally and vertically. After a few minutes due to the heat, the hidden message turns to brown color which can be seen.

UV Light Method-

The sample is placed in UV chamber after switching on the light. Observe the sample in both UV long and UV short. The hidden message becomes visible.

Repeat the same process every day following 20days for every sample to decode the hidden message.

As the days goes on, the hidden message gets less visible day by day.

Observation:

Table 1- Visibility under heat

Day	Milk	Onion juice	Soap water	Urine
1	+++	+++	++	+++
2	+++	+++	++	+++
3	+++	+++	++	+++
4	+++	+++	++	+++
5	+++	+++	++	+++
6	+++	+++	++	+++
7	+++	+++	++	+++
8	+++	+++	++	+++
9	+++	+++	++	+++
10	+++	+++	++	+++
11	+++	+++	++	+++
12	+++	+++	++	+++
13	+++	+++	++	+++
14	+++	+++	++	+++
15	+++	+++	++	+++
16	+++	+++	++	+++

17	+++	+++	++	+++
18	+++	+++	++	+++
19	+++	+++	+	+++
20	+++	+++	+	+++

Table 2- Visibility under UV long and short

Day	Milk		Onion juice		Soap water		Urine	
	UV Long	UV Short	UV Long	UV Short	UV Long	UV Short	UV Long	UV Short
1	-	+++	+++	+++	-	-	-	+++
2	-	++	+++	+++	-	-	-	+++
3	-	-	+++	+++	-	-	-	+++
4	-	+++	+++	+++	-	-	-	+++
5	-	+	+++	+++	-	-	-	+++
6	-	++	+++	+++	-	-	-	+++
7	-	+++	+++	+++	-	-	-	+++
8	-	+	+++	+++	-	-	-	+++
9	-	++	+++	+++	-	-	-	+++
10	-	-	+++	+++	-	-	-	+++
11	-	+	+++	+++	-	-	-	+++
12	-	++	+++	+++	-	-	-	-
13	-	++	+++	+++	-	-	-	-
14	-	++	+++	+++	-	-	-	+
15	-	+	+++	-	-	-	-	+++
16	-	++	+++	++	-	-	-	+++
17	-	+	+++	+++	-	-	-	+
18	-	+	-	++	-	-	-	++
19	-	++	++	++	-	-	-	++
20	-	+	+++	+	-	-	-	+

RESULT:

- After conducting the experiment for 20 days, the message is clearly visible & the visibility is not decreased in onion juice, milk and urine samples when they are exposed to heat. When it comes to soap water the visibility decreases from 19th day.
- When the samples are exposed to UV light long, then, there is no visibility when the milk, urine & soap water are exposed to UV long. And when the onion juice is exposed to UV long, the hidden message becomes clearly visible.
- When the samples are exposed to UV short, the onion juice and urine becomes clearly visible. And there is no visibility in soap water & visibility of milk decrease from 2nd day.

Images of urine when exposed to heat-



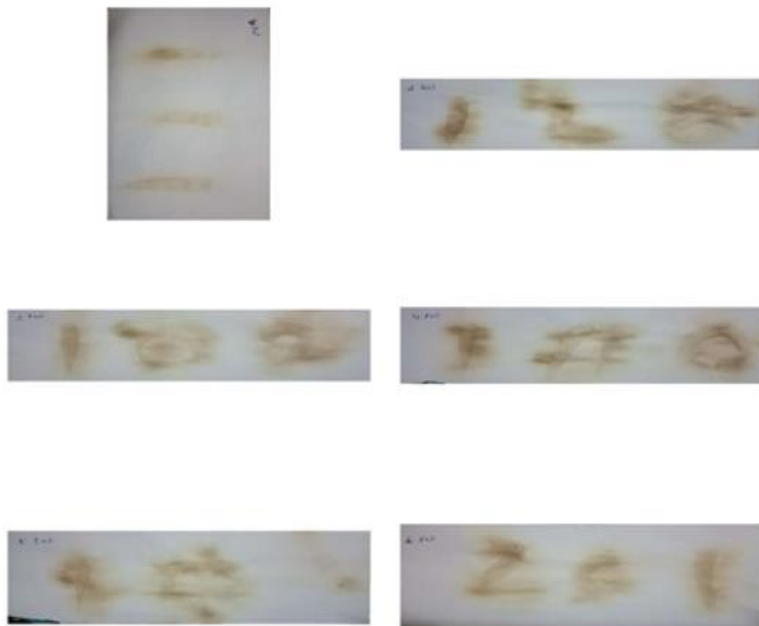
Images of milk when exposed to heat-



Images of onion juice when exposed to heat-



Images of soap water when exposed to heat-



DISCUSSION

Secret writings can be written with body fluids, vegetable juices, fruit juices etc. They can be deciphered using heat, chemicals and UV light methods. When the samples are exposed to heat, the secret message turns to brown colour because these fluids alter the fibers of the paper and weakens the paper.

When samples are exposed to UV light, the secret message becomes visible due to their fluorescence nature.

CONCLUSION

Based on the results obtained, it could be concluded that the best method for deciphering secret message is heating method. Because the secret message becomes clearly visible and almost all the invisible inks can be visualized. In UV method, we cannot visualize all the invisible inks and secret messages are not clear.

REFERENCES

1. Deepti Andharmule, Neeti Kapoor, Ashish Badiye. An Evaluation of some commonly used methods for visualization of secret writing. Research journal of forensic science. 2013; 1(3): 1-4.
2. Harne Prajakta, Mishra Munish K. , Sodhi G.S. Examination of invisible writing liquid composition and their decoders. Journal of forensic chemistry and toxicology. 2018; 4: 1-5.
3. Hussain SS and Sahu M. A study on common visualization methods for secret writing done by invisible inks and their sensitivity over a period of time. Austin Journal of forensic science and criminology. 2017; 4: 1-5.
4. Das Anamika and Dr. Suneet Kumar. A brief review on invisible ink: Its various types and examination methods. Journal of university of shanghai for science and technology. 2020; 22: 1-11.
5. Shipra Rohatgi, Shruti Gupta and Madhulika Sharma. An examination of some commonly utilized techniques for perception of secret writing. Indian journal of Forensic Medicine & Toxicology. 2020; 14: 1-8.
6. Vanshika, Israa J. Hakeem and Ranjith kumar Singh. Revealing the hidden : Deciphering the secret hand writing. Academic journal of Forensic sciences. 2022; 5: 1-7.
7. Nora M. Hilal, Rania H Twfiq. Study of disappearing ink writings on different types of documents. Egyptian journal of chemistry. 2020; 63: 1-16.