

Concepts

By analyzing evidence left at crime scenes, scientists and detectives can solve crimes.

W
o
r
d
s
t
o
k
n
o
w

- atom - a very very small particle that makes up all matter
- molecule - a small particle made of two or more atoms
- electron - a tiny, negatively charged particle found in atoms
- chemical reaction - an interaction of atoms or compounds to form new atoms or compounds.
- forensic scientist - a person who uses science to solve crimes
- trace evidence - material left at a crime scene
- latent - hidden
- fingerprint - the unique, permanent pattern of ridges and valleys on the underside of our fingers
- graphite - a form of carbon used in pencils and fingerprint powder
- mold - the impression a solid object leaves behind in soft material
- cast - formed from filling a mold; a copy of the item which created the mold
- luminol—a chemical which glows when it detects oxygen and iron present in blood
- DNA - deoxyribonucleic acid; this molecule forms the “blueprint” for life
- DNA profile - the unique pattern formed from analyzing a person’s DNA
- chromatography - a process used to separate and analyze mixtures

In the puzzle below, find and circle all the “words to know.”

Then use the leftover letters to discover the hidden message.

HIDDEN MESSAGE:

Y	F	N	O	U	C	C	A	D	N
U	O	O	A	S	H	E	C	N	E
N	R	I	H	T	R	T	S	A	C
O	E	T	E	E	O	M	I	P	N
R	N	C	F	T	M	M	S	R	E
T	S	A	I	I	A	T	R	O	D
C	I	E	N	H	T	Y	T	F	I
E	C	R	G	P	O	O	S	I	V
L	S	L	E	A	G	O	L	L	E
E	C	A	R	R	R	V	E	E	E
T	I	C	P	G	A	C	R	A	C
N	E	I	R	I	P	M	N	M	A
E	N	M	I	E	H	D	O	S	R
T	T	E	N	O	Y	L	M	S	T
A	I	H	T	I	D	O	M	S	I
L	S	C	L	O	N	I	M	U	L
A	T	M	O	L	E	C	U	L	E

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Chem Lab

Take-Home Activities



Crime Scene Chemistry

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WHERE DISCOVERIES BEGIN

Latent Prints

Find hidden clues!

Materials:

4 or 5 pieces of mechanical pencil lead
sealing plastic bag
large marker
fluffy paintbrush
fingerprints

To do and notice:

1. Place the pencil lead in the bag and seal the bag. Roll the marker over the bag to crush the pencil lead. Continue until the lead becomes a powder.



2. Find a smooth surface, like a window, mirror, or tile counter. Press your finger onto the surface
•Can you see your print?

3. Open the bag carefully. Dip the paintbrush into the powder. Carefully brush the powder where you left your print.
•Can you see your print now?



4. Find places where you think people have left fingerprints. Use your powder to reveal their prints.

A closer look:

Fingerprints are the unique, permanent pattern of ridges and valleys on the underside of our fingers. Because fingerprints can uniquely identify people, forensic scientists and police officers use fingerprints to understand who was present at a crime scene.

Your fingers produce a special mixture of amino acids, oil, and sweat that sticks to the plastic. Fingerprint powder sticks to this mixture and reveals your fingerprint.

The fingerprint powder you made is graphite, a form of carbon. (Even though we call it "pencil lead" it does not contain lead at all.) Graphite is an ingredient in professional fingerprint powders as well.

Invisible Ink

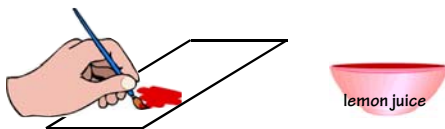
Create your own secret message!

Materials:

lemon juice
one piece of paper
one small brush or cotton swab
an oven (CAUTION: This experiment involves a hot oven; adult supervision is required.)

To do and notice:

1. Dip the brush or swab into the lemon juice, and use it to write on the piece of paper. Allow the paper to dry completely (about 15 minutes).
•Can you see the writing?



CAUTION: The following steps involve a hot oven; adult supervision is required.

2. Warm the oven to 350°F

3. Carefully place the paper on a rack in the oven. Close the oven, and cook the paper for 10 minutes.

4. Carefully take the paper out of the oven. Turn off the oven.
•Can you see the writing now?
•What does it look like?



A closer look:

At 350°F, the oven is hot enough to burn the chemicals in the lemon juice, but it is not hot enough to burn the chemicals in the paper. At it burns, the lemon juice combines with oxygen in the air. This causes a brown, scorched appearance on the paper. If the oven were hotter, the paper would also combine with oxygen and burn.

Plaster Casts

Make a plaster replica

Materials:

item to cast: finger, shoe, shell, small toy
oil based modeling clay
cereal box cut into two 2-inch wide strips
2 paper clips
paper cup
2 tablespoon plaster of paris
1 tablespoon water
tablespoon
fork



To do and notice:

1. Use the paper clips and the cereal box strips to make a ring as shown above. This ring must be bigger than the item you want to cast.

2. Roll out the modeling clay to about 1/2 inch thick. Set the paper ring into the clay. Firmly press the item you want to cast into the clay. Carefully remove the item from the clay.
•Do you see the mold of your item?



3. In the paper cup, add the plaster of paris and the water. Mix with the fork to make sure there are no lumps. Carefully fill your mold with the plaster. Leave the plaster to dry for a few hours or overnight. DO NOT pour extra plaster down the sink.
4. When the plaster is completely dry, carefully remove the clay. You have made a plaster cast.
•Does your cast look like the original item?

A closer look:

Plaster of paris is made from calcium sulfate (CaSO_4). As it combines with water, it makes a paste which solidifies.

Scientists and detectives can use plaster casts to preserve animal tracks, tire tracks, or footprints left in soft dirt or mud. The cast is a copy of whatever left the imprint.

