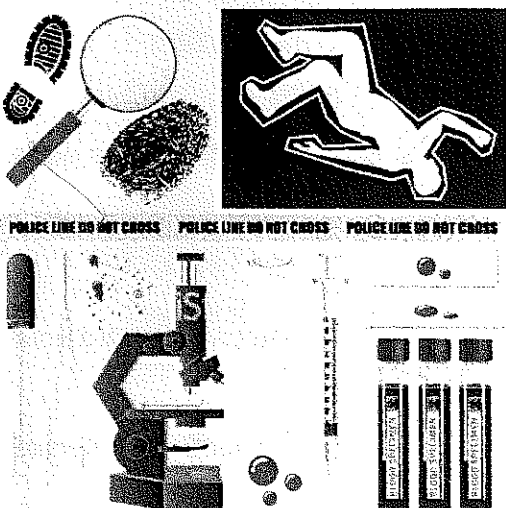


C.T. Science Unknown Chemical Crime Scene Lab; LGPD Case # 1379a

BACKGROUND—You and your team have just come back to work at CSICT to witness a horrific scene: police and detectives are gingerly gathering evidence and photographing the campus before the first bell and 6th and 7th grade students are gathered en-mass outside the door and windows of science room 8. Your team walks forward for a closer look and to your astonishment you see your former science teacher Mr. T. lying on the floor of his classroom, unconscious, lab coat torn to shreds, and clutching his prized saber-toothed kitty skull which he bought at the gift shop at the La Brea Tar Pits courageously dug up in one of the most spectacular fossil finds of all time.

Your team interviews the lead detective on-scene and discovers that a classroom window was found broken and that the science supply lab and classroom were a mess, as if a fight had occurred between Mr. T. and an unknown assailant for some reason. A dry-chemical jar from the science store room had fallen and broken, leaving behind a solid chemical spill all over the floor nearby. When detectives site-tested this chemical it was found to react to form a gas when combined with acid, turned black using a standard iodine test, and mysteriously melted when heated.

As Mr. T. is being loaded into the ambulance to be taken to Tahiti the hospital to recover, you learn from the detective that three suspects have been detained by Assistant Principal Julie in the office: a one-sandaled man with dark scraggly hair and a leather eye-patch that says "Pokemon", Ms. Kidwell, and a thin homeless dog with a serious flea problem and who's collar name's him as "Bruiser". Your team immediately jumps into action, taking chemical samples from the foot (or paw, as the case may be) of each suspect. One-sandaled man, Sample A; Ms. Kidwell, Sample B; Bruiser, Sample C. Your mission, should you decide to accept it (and n'er say you shouldn't) is to solve the mystery of what happened to Mr. T.



INTRODUCTION—In this activity you will investigate chemical and physical properties of materials and evidence of chemical reactions. A chemical reaction is a process in which individual elements re-combine to form a new compound or a compound decomposes to into the elements that make it up. Compounds can also combine with other compounds to form new compounds. In a chemical reaction the reactants are always different than the products because of changes in the atomic bonds between the atoms. Mixtures, on the other hand, do not involve changes in the chemical bonds and are examples of physical properties. Pizza topping would be an example of a mixture while a cake would be an example of a compound (yeast and dough combine to form something new/different). Chemical changes often involve changes in color, state, or temperature.

PURPOSE—What type of reactions, physical or chemical, and what state changes occur when combining the different powders with the different liquids below, or when doing the heat test in order to determine what happened? Can you identify the three mystery powders by comparing their reactions to the reactions for the six known powders and solving the mystery of why Mr. T. was found unconscious grasping his saber-toothed kitty skull?

CAUTION!

Since this chemistry lab involves glassware, if you are wearing open-toed shoes you must change out of them or schedule a time to do the lab after school Thursday! Use care when working with heat! Long hair must be tied back. Sleeves must be rolled up. Keep papers (and anything flammable) away from the flame. Goggles must be worn at all times, since the powder may melt and splatter into your eyes causing temporary blindness!

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MATERIALS—Per team of three

- 1) 1 wells chemical spotting plate
- 2) About 15 toothpicks
- 3) Chemical spill apron
- 4) Goggles
- 5) Acetic acid dropping bottle (**CAUTION!**)
- 6) 9 squares of aluminum foil
- 7) **One at a time**—Powder 1, 2, 3, 4, 5, 6, and then mystery samples A, B, & C (there are 9 powders to be tested in all).
- 8) Iodine solution dropping bottle (**CAUTION! Stains cloths**)
- 9) Water dropping bottle
- 10) Chemical heat tongs
- 11) Candle
- 12) Straw spoon

DESIGN A DATA TABLE

On a piece of scratch paper, and later with your instructor's signature (not Mr. T. because of course he is in the Bahamas hospital) in your lab notebook design a data table that shows the results of each of the four tests with each of the 9 samples. The four tests are to mix each of the 9 chemical powders with water, acetic acid, iodine, and a flame test for each. Your data table should have a column titled "initial observations before reaction", and boxes for observation words such as "no reaction", "gasses & fizzing", "color change from ____ to ____", "got hotter", etc. When you have your instructor's approval, copy your complete data table into your lab notebook on a whole side of paper, and get your instructor's signature again.



IMPORTANT: Each CSICT detective team should test only one powder at a time! DO NOT ALLOW SAMPLES TO MIX TOGETHER!

DIRECTIONS

For each sample, one at a time...

Step 1: Place 3 small samples of powder 1 (about half the size of a dime) into each of 3 wells of the wells chemical plate.

Step 2: Describe the powder sample and write your observations in your data table.

Step 3: Add 4 to 5 drops of WATER to the 1st well of powder 1 and mix using a clean toothpick. Record your observations in data table.

Step 4: Add 4 to 5 drops of acetic acid to the 2nd pile of powder 1 and mix using a clean toothpick. Record your observations in data table. (HINT: Fizz or no reaction)

Step 5: Add 4 to 5 drops of IODINE to the 3rd well of powder 1 and mix using a clean toothpick. Record your observations in the chart. (HINT: Black, brown, or no reaction) **CAUTION:** Iodine will stain clothing, hands, and anything it touches!

Step 6: For the HEAT test, place the same amount of powder 1 on a clean square of aluminum foil. Bend the edges up to create a "cup" and hold onto it using a pair of tongs or tweezers. Hold the sample over the candle flame for a few seconds. Record your observations in data table.

Step 7: Wash/dispose of all materials that touched powder 1 and repeat steps 1-7 for powder 2, etc.

RESULTS/ANALYSIS--

Use your lab data to determine the answers to the following questions

- 1) What state changes occurred in this lab (ie "a solid changed to a gas" etc)? _____

- 2) Chemical changes involve changes in the (from introduction) _____ while physical changes (do/do not)
- 3) A student drops some iodine on a piece of paper and it turns dark blue. What chemical powder from this lab is present?
- 4) In what ways are the first six powders different?
- 5) Do you think mystery samples A, B, and C are pure powders or some combination of one or more of powders 1-6? Why?
- 6) In what ways are the three powders similar?
- 7) Which of the 36 tests that you performed do you think were chemical changes and which were merely physical?

<u>Chemical ("C") or physical change ("P")?</u>	<u>Evidence that supports my decision</u>
<u>Powder #1 and Acid</u> _____	_____
<u>Powder #1 and Iodine</u> _____	_____
<u>Powder #1 and Water</u> _____	_____
<u>Powder #1 and heat</u> _____	_____
<u>Powder #2 and Acid</u> _____	_____
<u>Powder #2 and Iodine</u> _____	_____
<u>Powder #2 and Water</u> _____	_____
<u>Powder #2 and heat</u> _____	_____
<u>Powder #3 and Acid</u> _____	_____
<u>Powder #3 and Iodine</u> _____	_____
<u>Powder #3 and Water</u> _____	_____
<u>Powder #3 and heat</u> _____	_____
<u>Powder #4 and Acid</u> _____	_____
<u>Powder #4 and Iodine</u> _____	_____
<u>Powder #4 and Water</u> _____	_____
<u>Powder #4 and heat</u> _____	_____
<u>Powder #5 and Acid</u> _____	_____
<u>Powder #5 and Iodine</u> _____	_____
<u>Powder #5 and Water</u> _____	_____

Powder #5 and heat

Powder #6 and Acid

Powder #6 and Iodine

Powder #6 and Water

Powder #6 and heat

Mystery A and Acid

Mystery A and Iodine

Mystery A and Water

Mystery A and heat

Mystery B and Acid

Mystery B and Iodine

Mystery B and Water

Mystery B and heat

Mystery C and Acid

Mystery C and Iodine

Mystery C and Water

Mystery C and heat

8) So, the \$10.00 question now becomes, which suspect was most likely inside Mr. T's room? Does that mean they necessarily harmed him? What do you think this suspect was doing in the room? Be sure to go back and read the "Background" again to get all the details of the crime scene. Write a minimum 3-paragraph (7 sentences each) essay giving evidence to support your reasoning, separating inference from observation, and

making a recommendation for arrest or further questioning. Be sure to include introductory, closing, transition, and body sentences with main theme clearly defined. Most importantly, for this story anyway, did Mr. T. finally get to go to Tahiti or the Bahamas, and if so, what happened to him after that?

