



CSI Sarracino

Modified from <http://www.scienceteacherprogram.org/biology/Lytle07.html>

Standard/Benchmarks:

- Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge
- Know how to use density, boiling point, and freezing point to identify various substances
- Use mathematical expressions and techniques to explain data and observations and to communicate findings

Objective:

Use understanding of physical properties of matter to solve a “crime”

Prerequisite Learning:

Lab safety

Measuring mass

Measuring density

Measuring freezing/boiling point

Skills/Concepts Introduced:

Problem-solving

Activity Overview:

The purpose of this activity is to reinforce previously-learned skills associated with physical property measurements to problem-solve. A murder scenario is presented to the students, and their objective is to determine “whodunit”. Several materials are collected from the suspects, and the students must



determine their physical properties. When the properties of the crime scene samples are revealed, the students must then identify the items, and logically associate them with the murderer.

Preparation:

Provide each of the following objects, and determine the mass beforehand: wrench, fishing lure, spoon

Provide a container of each of the following unconsolidated material, and determine the density beforehand: graphite, wet sand, granulated sugar (These will stay in the containers, preferably small vials. Include an empty one.)

Provide samples of each of the following liquids, and determine the boiling and freezing point beforehand: antifreeze solution, saltwater solution, soda

Provide the following instruments/tools: graduated cylinders, balances, hot plates, dry ice, Styrofoam cups, beakers

Time Allotment: ~90 minutes

Student Handout:

CSI SARRACINO: CASE #372: WHO KNOCKED OFF TONY DEMARCO?

Tony Demarco, age 36, was found dead in an alley at 4 am on Monday, October 1. He appears to have died due to physical battery and suffocation by liquid. It is your job to determine exactly how he died, and who was involved.



ECOHYDROGEOLOGY IN THE MIDDLE RIO GRANDE ENVIRONMENT

You have just been given some materials that were recovered during the investigation and autopsy. You have:

1. a sample of the fluid from his lungs,
2. a dry substance collected from under his fingernails, and
3. an object found near the body.

These substances are unknown, and must be compared to samples that you already have in your lab.

There are three suspects. Each of them had a recent dispute with Tony regarding unpaid bills. Verbal threats have been documented. The suspects are being held for questioning at this point. They are:

1. Sammy Jones: a fisherman
2. Joey Diggs: a donut shop employee
3. Maria Tambo: an automotive mechanic

Before you can identify the crime scene items, you must determine the properties of the known substances in your lab. Fill out the following tables.

Pliers mass (g)	
Fishing lure mass (g)	
Spoon mass (g)	

Sand density (g/cm ³)	
Powdered sugar density (g/cm ³)	
Graphite density (g/cm ³)	

7-Up freezing point (°C)	
Antifreeze freezing point (°C)	
Saltwater freezing point (°C)	



7-Up boiling point (°C)	
Antifreeze boiling point (°C)	
Saltwater boiling point (°C)	

Here are the properties of the crime scene samples. Determine what the samples are.

- 1) The liquid found in the lungs has a freezing/boiling point of xxx. What is it?
- 2) The dry sample collected from beneath the fingernails has a density of xxx. What is it?
- 3) The object found near the body has a mass of xxx. What is it?
- 4) Who did it?
- 5) Explain how you think the crime was committed.