High School Science Virtual Learning

Forensic Science
Role of Chemistry

May 12, 2020

High School Forensic Science
Lesson: May 12, 2020

Objective/Learning Target:

Students will be able to identify the various roles of Chemistry in Forensic Science.

1. What do you think Forensic Science is?

2. Forensics Science is an interdisciplinary field, what are some other various fields of science that are used in Forensic Science?

1. Forensic science deals with the application of science to legal matters, and, in particular, to crime solving.

2. Biology, Psychology, Geology, Physics, and Chemistry

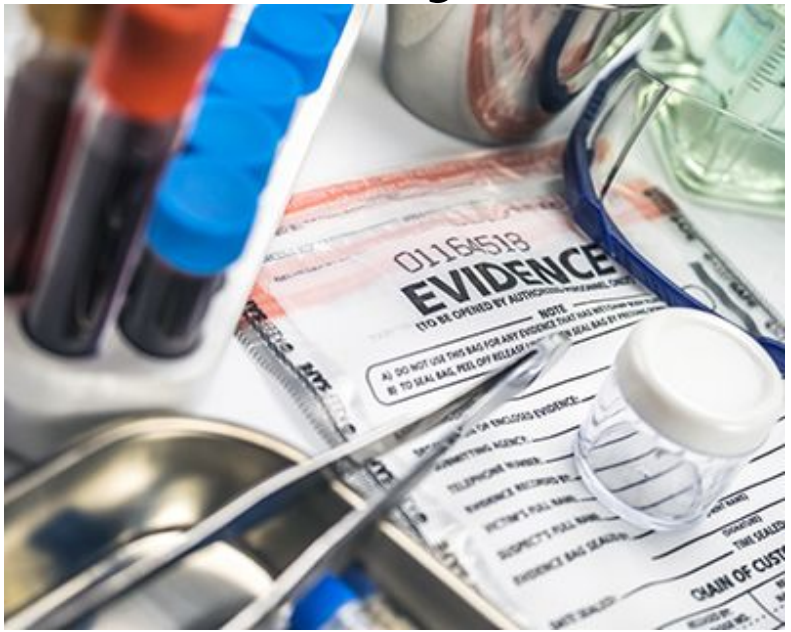
Lesson Activity:

Directions: Watch the video below and read through the information provided on the next few slides.

Link(s): Forensic Chemistry Unit

Role of Chemistry

Applying the principles and laws that are taught in traditional chemistry to find the chemistry of evidence.

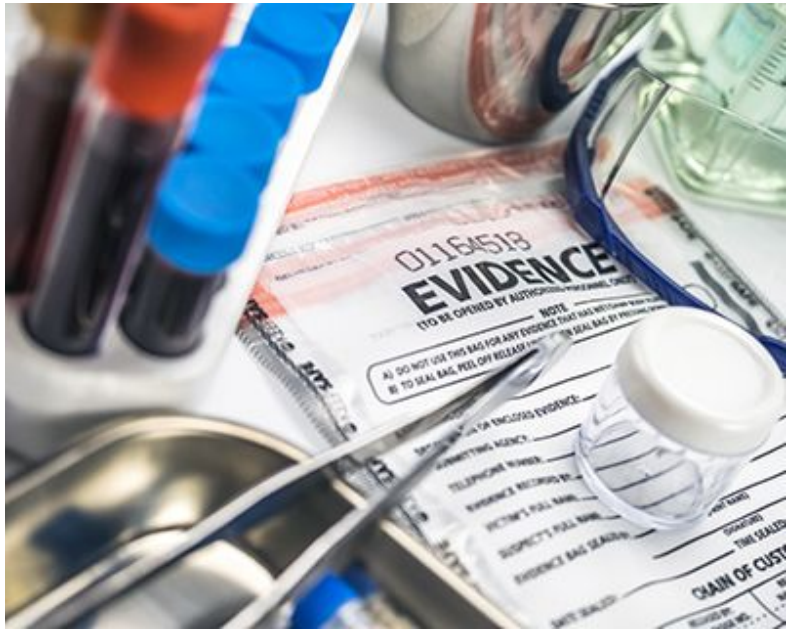


Mixtures

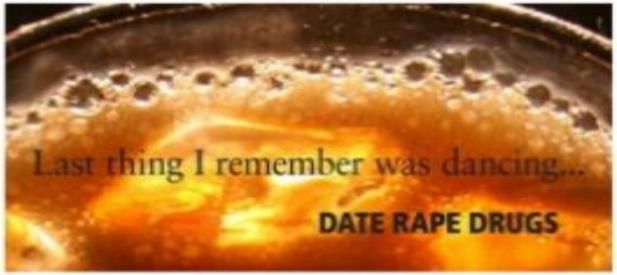
Is a physical blend of two or more components.

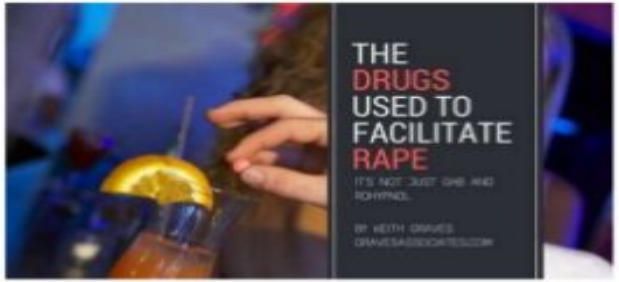
Heterogeneous Mixture: A mixture in which the composition is not uniform throughout.

Homogeneous Mixture: Is a mixture in which the composition is uniform throughout which is also known as a solution.

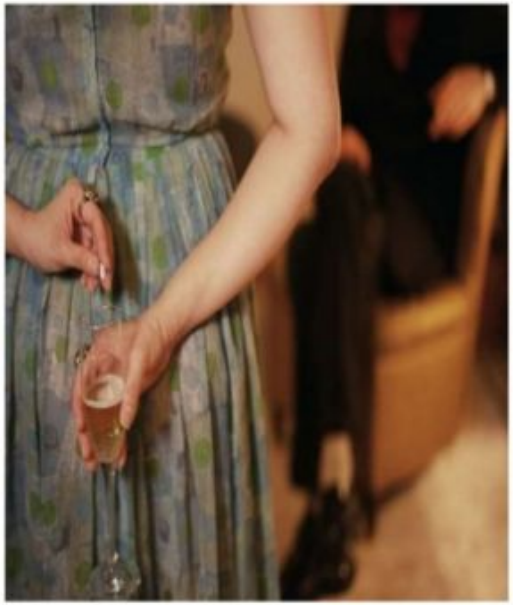


Why talk about mixtures in Forensic Science?





Mixtures in drug assisted crimes



DATE
RAPE
DRUGS

Date Rape Drugs

Date rape drugs refers to any drug that can be used to assist in the commission of a sexual assault and can be dissolved in a person's drink to form a **homogeneous solution**.

Drugs may be added to a food or drink without the victim's knowledge and may have:

- Sedative
- Hypnotic
- Dissociative and/or
- Amnesiac effects

Forensic Analysis of Date Rape Drugs

Detected through a urine sample test, but rohypnol can also be detected through a blood test.

GHB, Ketamine and Benzodiazepines like flunitrazepam can be analyzed by UV spectrometry at 314 nm.

Testing kits that detect Date rape drugs are commercially available under the name of "the drink detective".

In toxicology, routine test are performed on drug of forensic interest such as spot tests, IR, NMR, Thin layer Chromatography, Immunoassay, GC-MS, LC-MS, HPLC, etc.

Cocaine and the Impurities

Cocaine sold on the illegal drug market are usually **heterogeneous mixtures.** Drug dealers boost their profits by mixing cocaine with fillers to increase the sample size.

Forensic drug chemists have found some fillers including:

- Sugar
- Baking soda
- Talcum powder
- Even Tang breakfast drink powder!

Forensic Analysis of Cocaine

For cocaine containing exhibits, combinations of testing methods such as:

- Scott's color test
- TLC
- FTIR
- Ultraviolet Spectrophotometry
- GC coupled with FID and/or MS and
- HPLC

Practice

You will use the information from the activity to answer the following questions.

Questions:

1. Classify the following types of matter as either homogeneous or heterogeneous:
   a. Pure air b. Air with smog c. Sugar water
2. Classify the following as pure substances (element or compound) or mixtures:
   a. Sodium b. Water c. Salt water
   d. Oxygen e. Carbon dioxide f. Nail polish

Questions:

3. Check the appropriate categories for the substances listed in the table on the following slide. All substances will have a check in more than one column.

Substance	Heterogeneous Matter	Homogeneous Matter	Pure Substance	Solution	Element	Compound	Mixture
Lead metal							
Table salt (NaCl)							
Kool-Aid drink							
Vegetable soup							
Oxygen gas							
Distilled water							

Once you have completed the practice questions check with the answer key.

1. A. Homogeneous B. Heterogeneous C. Homogeneous
2. A. Pure Substance: Element B. Pure Substance: Compound C. Mixture
   D. Pure Substance: Element E. Pure Substance: Compound F. Mixture
3.

Substance	Heterogeneous Matter	Homogeneous Matter	Pure Substance	Solution	Element	Compound	Mixture
lead metal		✓	✓		✓		
table salt (NaCl)		✓	✓			✓	
Kool-Aid drink		✓		✓			✓
vegetable soup	✓						✓
oxygen gas		✓	✓			✓	
distilled water		✓	✓			✓	

Additional Practice

1. Mixtures and Solutions
2. Classifying Matter