Unit 5: Drug Analysis and Toxicology

Content Area: **Science**
Course(s):
Time Period: **Marking Period 4**
Length: **3 weeks**
Status: **Published**

Brief Summary of Unit

This unit focuses on drug identification and toxicology, dealing predominately with methods and techniques for the identification of drugs and poisons. The main focus will be methods for isolation and identification of foreign substances, toxins, drugs, and poisons that may have been a contributing factor in a crime. This will include how the relevance and value of forensic toxicology continues to increase with the accelerated drug use and access to drugs within society. Throughout this unit, students will understand the relevance and applicability of toxicology and drug analysis to resolving crimes.

Revised: July 202

Essential Questions/Enduring Understandings

Essential Questions

- What laboratory tests are normally used to perform a routine drug identification analysis?
- What is the significance of finding a drug in human tissues to assess impairment?
- How are the results of chromatography (thin layer and gas) interpreted and utilized for identification analysis?

Enduring Understandings

- Students can discuss the types of tests and methods for analysis that investigators use when performing drug identification analyses and determine the implications of the presence of particular drugs in determining the level of impairment and symptoms that would be expected in an individual under the influence.
- Students are adept at interpreting the results of chromatography tests run on unknown samples and comparing them to known samples to determine which toxin or drug is present based on the patterning reflected in the chromatography results.

Objectives

- Students will know the major tests utilized in a routine drug identification analysis.
- Students will know the major drugs and impacts of each on a human body.
- Students will know the influence of particular drugs on human impairment and capability as well as the

standard time frame observed.
- Students will know the difference between gas chromatography and thin-layer chromatography.
- Students will be skilled at interpreting the results of the chromatography test and drawing reasonable conclusions.
- Students will know the proper techniques for collecting and preserving drug evidence.
- Students will know the techniques used to isolate and identify drugs and poisons.
- Students will know how mass spectrometry is used for identification analysis.
- Students will know the relevance and applicability of toxicology in resolving investigations.

Learning Plan

- Preview essential questions and connect to learning throughout the unit.
- Establish prior knowledge and understanding prior to the start of the unit.
- Introduction to the material via direct instruction with the use of Google Slides presentations and infographics.
- Participate in demonstrations and activities that build upon information delivered via direct instruction.
- Analyze and consider sample data sets from various toxicology tests such as gas chromatography and practice identifying drugs.
- Complete lab activities on forensic toxicology techniques with thin layer chromatography and identifying an unknown white powder
- Read and discuss relevant case studies
- Develop a complex understanding of how toxicologic evidence and analysis can be used to resolve an investigation.

Assessment

Formative

- Do Now Questions
- Exit Ticket Questions
- Whole class discussion participation
- Small group discussion participation
- Individual student questions/responses
- Independent tasks
- Lab experiments
- Quizzes

Summative

- Unit quiz
- Lab activities throughout the unit
    - Forensic Toxicology Lab
        - Identifying an unknown white powder
        - Lab on thin layer chromatography

- Practicum on techniques used in this unit

Benchmark

- Final Exam

Alternative Assessments

- Open note test
- Project on toxicology-->Create your own case study

Materials

- Forensic Science, An Introduction by Roy Saferstein textbook
- Forensic Toxicology & Drug Analysis Google Slides
- Assorted episodes of Forensic Files & CSI Season 1
- Lab materials

Standards

9.4.2.CI	Creativity and Innovation
9.4.2.CT	Critical Thinking and Problem-solving
	Critical thinkers must first identify a problem then develop a plan to address it to effectively solve the problem.
9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
LA.W.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (MLA or APA Style Manuals).
LA.L.11-12.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
LA.L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
LS1.A	Structure and Function
	Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

	Using Mathematics and Computational Thinking
HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
	Constructing explanations and designing solutions 9–12 builds on K – experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.
ETS1.C	Optimizing the Design Solution
HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
ETS1.B	Developing Possible Solutions

Integrated Accommodations

https://docs.google.com/spreadsheets/d/1bNVkTLbqLR5r3E-ETSqwadv_OtCH2l2X-BUSpTi9kCQ/edit?usp=sharing