

Lovejoy High School
Forensics



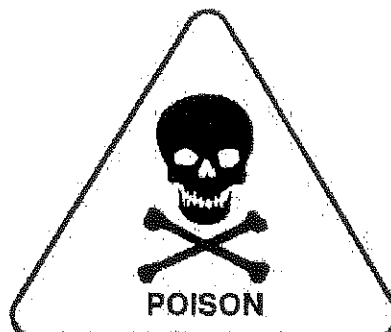
Unit 5 Guide: Drugs and Toxicology

Learning Goals:

- Classify commonly used drugs.
- Identify and describe tests used to perform drug identification.
- Explain the purpose of chromatography.
- Describe the use of ultraviolet and infrared spectroscopy for the identification of organic compounds.
- Diagram the spectrophotometer showing the importance of its function in relationship to forensic science.
- Differentiate psychological and physical dependence on drugs.
- Identify the uses of a spot test.
- Communicate the different ways that drugs can be identified.
- Identify common tests for marijuana.
- Recognize the absorption, transportation, and elimination of alcohol in the human body.
- Review how alcohol is secreted through the respiratory system and connect how this is used in forensic science.
- Differentiate between infrared and fuel cell breath testing devices.
- Compare and contrast the laboratory procedures for measuring blood alcohol content.
 - Relate the precautions taken for proper preservation of blood to be processed in the lab and its connections with drugs and alcohol.

Key terms: chromatography, toxicology, spectroscopy, organic compounds, spectrophotometer, spot test, BAL, infrared breath testing, fuel cell breath testing, controlled drugs, cannabis, alkaloid, analgesics, metabolism, presumptive test, ions

Reading for Understanding: Chapters 7 & 8



Chapter 7 Drugs

I. Drugs and Crime A. Vocabulary

1. drug

- a. OTC
- b. Prescription
- c. Illicit drug
- d. "Controlled substances" - _____ by _____.

2. Controlled Substances Act

B. Controlled Substances Act Schedule I-V

1. Schedule I—

EX: _____

2. Schedule II—

EX: _____

3. Schedule III—

EX: _____

4. Schedule IV—

Ex. _____ and _____ including
_____, _____, _____, _____, _____.

5. Schedule V—

EX: _____ in low doses in _____.

Human Components Used for Drug Analysis

- a. _____ e. _____ h. _____
- b. _____ f. _____ i. _____
- c. _____ g. _____ j. _____
of the eye
- d. _____

II. Types of Drugs

- A. _____ B. _____
- C. _____ D. _____
- D. _____

A. Narcotics & Analgesics - _____ a state of _____
or _____. Most _____ from the _____ plant
Ex: _____, _____, _____
_____.

B. Hallucinogen - _____ marked _____ in normal
_____ process, _____, and _____.
EX: _____, _____, _____, _____

C. Depressants - _____ (slow down) _____ in the
_____.

D. Stimulants - _____ (speed up) _____ in the

Ex: _____, _____, _____
_____.

III. Drug Identification: Reference Materials and Analytical Tests

A. PDR—

B. Presumptive Field Tests—

1. Spot Tests

a. Marquis -

b. Dillie-Koppanyi -

c. Duquenois-Levine

d. Van Urk -

e. Scott Test

2. Chromatography-

a. Paper chromatography-

b. Thin Layer Chromatography -

c. Gas Chromatography

IV. Drug Identification: Confirmatory Tests

1. Spectroscopy

2. Spectrophotometer

Toxicology

I. Definition—

Forensic Toxicology

II. Toxic substances may:

1. _____
2. _____
3. _____
4. _____

III. Factors of Toxicity

Toxicity Dosage Classes

LD ₅₀ (rat,oral)	Correlation to Ingestion by 150 lb Adult Human	Toxicity
<1mg/kg		
1-50 mg/kg		
50-500 mg/kg		
500-5000 mg/kg		
5-15 g/kg		
Over 15g/kg		

A. Federal Regulatory Agencies

IV. Symptoms of Various Types of Poisoning

- ☒ Caustic Poison (lye)
- ☒ Carbon Monoxide

- ☒ Sulfuric acid
- ☒ Hydrochloric acid
- ☒ Nitric acid

☒ Phosphorous

☒ Cyanide

☒ Arsenic, Mercury

☒ Methyl (wood) or Isopropyl (rubbing) alcohol

V. To Prove a Case

1. Prove a _____ was _____

2. _____

3. _____

4. _____ to _____

5. _____ to _____

6. _____ was _____ by _____

7. Death was _____

VI. Forensic Autopsy -

Order toxicology screens:

☒ Human Specimens for Analysis:

Name _____ Drug Questions Date _____ Pd _____

1. What are the differences among a controlled substance, an illicit drug, a prescription drug, and an OTC (over the counter) drug
2. How are illicit drugs classified?
3. Under what schedule are the following illicit drugs ? Anabolic steroids, Marijuana
Codeine in low doses, Cocaine, Ecstasy, Xanax.
4. Give the potential for abuse, and the physical and psychological dependenc for each of the following: Marijuana, Xanax, Steroids, Cocaine, Codeine
5. I found a substance at a crime scene that turns violet blue with the presumptive color tests. What is it?

What schedule?

6. I found a substance at a crime scene that turns orange brown with the presumptive color tests. What is it?

What schedule?

7. What are the stationary and mobile phases in paper chromatography?

In thin layer chromatography?

In Gas chromatography?

8. Is Gas chromatography considered a confirmatory test?

What are its two uses?

9. What is a spectrophotometer?

10. Why isn't mass spectrometry used exclusively as a confirmatory test?

11. What is the best way to identify and confirm the components of a mixture?

Name _____ Toxicology Questions

Date _____ Pd _____

1. Define toxicology and give 3 types.
2. Any substance can be toxic. What does this depend on?
3. What can toxic substances cause in humans?
4. Give 5 factors that affect the toxicity of a substance.
5. What does lethal dose LD_{50} mean?

6. How much of a substance must be ingested for

Extremely toxic substance? _____

Highly toxic? _____

Moderately toxic? _____

Slightly toxic? _____

Relatively harmless? _____

7. What are the symptoms for the following poisons?

Cyanide

methyl alcohol

arsenic

mercury

carbon monoxide

8. What are the seven things required to prove a case of poisoning?

9. What 3 things do you look for in a forensic autopsy that would indicate poisoning?

Name: _____ Period: _____

Long-Term Effects of Drugs
Forensic Science

Discuss the following within your group using the research you each completed.

1. As a group, discuss and summarize (in 3 sentences or more) the short term effect of Hallucinogens on the body.
2. As a group, discuss and summarize (in 3 sentences or more) the long term effects of stimulants on the body.
3. As a group, discuss and summarize (in 3 sentences or more) the short term effects of Narcotics on the body.
4. As a group, discuss and summarize (in 3 sentences or more) the treatment options for Alcohol.
5. Of the 4 categories, which is the most dangerous to your health immediately after taking it? Use research to justify (back-up) your argument.

6. Of the 4 categories, which is the most dangerous to your health over long periods of time? Use your research to justify (back-up) your argument.

7. Which of the 4 categories would treatment options be the most undesirable? Use your research to justify (back-up) your argument.

Name _____ Drug, Toxicology, Blood Alcohol Test Review Date _____ Pd _____

1. Which schedule(s) drug(s) do not have a currently accepted medical use in the US? _____
2. What type of drug cannot be prescribed by a physician? _____
3. Mixtures of unknown substances can be identified using what 2 analysis?
4. What % of the evidence examined in a forensic lab is from drugs/drug related crimes? _____
5. Which of the following drugs would be considered relatively harmless when used according to the directions given? (Heroin, codeine, steroids, amphetamines, aspirin). Why?
6. A spot test can tell you what about an unknown substance?
7. Give examples of Schedule I - V drugs and their degree of dependence.
8. The federal agency most responsible for drug crime enforcement is the _____.
9. What single factor is the most important in determining whether a substance is toxic or not? _____
10. Which human components can be used for drug or toxicology analysis?
11. What regulatory agencies are involved in forensic toxicology?
12. Define Lethal dose (LD_{50}) .
13. Name 5 factors that influence the effect of poisons in the body.
14. To prove a case of poisoning, what 7 things must you have?
15. What would make a medical examiner suspect poisoning by cyanide? _____

16. What on the nails might indicate a person has been poisoned? _____
17. What would indicate arsenic or mercury poisoning? _____
18. How much of a LD50 dose must be ingested for a substance to be considered? Extremely toxic _____ highly toxic _____ moderately toxic _____ slightly toxic _____ practically nontoxic _____ relatively harmless _____
19. Name the 5 areas of forensic toxicology.
20. Give 4 consequences of toxic substances found in humans.
21. What % of traffic deaths in the US are alcohol related? _____
22. What does BAC stand for and what is it dependent on?
23. Why can a blood alcohol content (BAC) be determined by a breath test?
24. What might be true about an individual whose BAC level is found to be above 0.08%?
25. Ethyl Alcohol is considered to be a (stimulant, depressant, hallucinogen, or narcotic).

Find the % blood alcohol, effect, and clinical symptoms for problem 26-29.

26. A 100lb female with a high tolerance drinks 5 beers in 1 hour and 20 minutes.
27. A 240lb male w/ a low tolerance takes 7 drinks in 2 hours and 40 minutes.
28. A 140lb male w/ a high tolerance takes 6 drinks in 1 hour and 20 minutes.
29. A 120lb female with a low tolerance drinks 8 beers in 2 hours.