

CH 114 Learning Objectives, Chapter Summaries and Study Guide for Exam #2

Arson; after completing this section you should be able to:

**Describe the role the criminalist takes in arson investigations**

**Describe the goal of searching a fire scene and explain why a warrant is not required**

**Recognize the telltale signs of an accelerant-initiated fire**

**Describe how to collect physical evidence at the scene of a suspected arson**

**Describe what laboratory procedures are used to detect and identify hydrocarbon residues**

Describe in general, the chemistry of fire and the types of substances are required and produced

Define energy, list several different types of energy and describe the role energy plays in a chemical reaction

Compare and contrast exothermic and endothermic reactions

Define and give an example of ignition temperature

**Explain why fire is described as a chain reaction**

Describe what things must happen to the molecules in order for a reaction to occur

**Describe what factors affect the rate of a combustion reaction**

Explain how non-gaseous fuels burn

**List the three basic ingredients of a flaming fire**

Explain how fuels can burn without a flame

Define spontaneous combustion

**Give an example and briefly explain an oxidation reaction not involving oxygen**

Explosives; after completing this section you should be able to:

Describe how physical evidence is collected at the scene of an explosion

Describe laboratory procedures used to detect and identify explosive residues

Understand how explosives are classified

Describe what happens to explosive evidence once in the lab and what confirmatory tests are run

Explain how taggants are used in an explosion investigation

Forensic Serology; after completing this section you should be able to:

**1) List A-B-O antigens and antibodies found in each blood type, A, B, AB and O**

2) Describe how whole blood is typed

**3) Describe the forensic tests used to characterize a stain as blood**

4) Understand how antigen-antibody interactions are applied to species identification and drug identification

5) Explain the differences between monoclonal and polyclonal antibodies

6) Describe how are chromosomes and genes different

**7) Use a Punnett square to determine the genotypes and phenotypes of offspring**

**8) Describe the proper collection and preservation of suspect blood stains**

DNA; after completing this section you should be able to:

- 1) Describe the structure of DNA including the components of the backbone, the base and complementary base pairing.**
- 2) Understand and explain how base pairing contributes to the double helix structure of DNA
- 3) Describe the processes of replication, transcription and translation**
- 4) Given an original strand of DNA, provide the sequence of the template strand, mRNA and amino acid sequence for the protein**
- 5) Contrast DNA strands coding for the production of proteins with strands containing repeating base sequences**
- 6) Explain the technology of PCR and how it applies to forensic DNA typing**
- 7) Understand and explain the structure and use of STRs**
- 8) Type DNA using gel electrophoresis and capillary electrophoresis**
- 9) Contrast nuclear and mitochondrial DNA
- 10) Explain the use of computerized DNA databases used in criminal investigations
- 11) Describe what procedures must be followed for the proper preservation of bloodstained evidence for DNA analysis**