

## CH 114 Chapter Reading Guide and Study Guide for Exam #1

These questions are based on the Learning Objectives listed at the beginning of each chapter.

### Chapter 1

- 1) What is the difference between forensic science and criminalistics?
- 2) What one person do you think contributed the most to the development of forensic science? Briefly explain their contributions.
- 3) What is Locard's exchange principle?
- 4) What two possible factors have contributed to the rapid growth of forensic labs in the past four decades?
- 5) What are two services of a typical crime lab?
- 6) What the similarities and differences (compare and contrast) the Frye and Daubert decisions relating to the admissibility of scientific evidence in the courtroom?
- 7) What are the roles and responsibilities of the expert witness?
- 8) What other specialized services are available to law enforcement personnel?

### Chapter 4

- 1) What are the physical and chemical properties of matter?
- 2) How does the metric system work?
- 3) What is density?
- 4) What is refractive index?
- 5) How can density and refractive index be used in forensic science?
- 6) How can glass fragments be compared?
- 7) How can glass fractures be used to determine the direction of impact?
- 8) What are the important forensic properties of soil?
- 9) How are glass and soil samples collected as evidence?

## Chapter 5

- 1) What are elements? Give three examples.
- 2) What are compounds? Give three examples.
- 3) How are solids, liquids and gases alike? How are they different?
- 4) What is the difference between organic and inorganic compounds?
- 5) What is the difference between qualitative and quantitative analysis?
- 6) How does the process of chromatography work?
- 7) What are the differences between thin-layer chromatography, gas chromatography and electrophoresis?
- 8) What are the differences between the wave and particle theories of light?
- 9) What is the electromagnetic spectrum?
- 10) How are ultraviolet and infrared spectroscopy used to identify organic compounds?
- 11) How is mass-spectroscopy used for identification analysis?

## Chapter 6

- 1) How are trace elements used for forensic analysis of physical evidence?
- 2) How does a continuous emission spectrum differ from a line spectrum?
- 3) What are protons, neutrons and electrons? Where is each found? What is the significance of each particle?
- 4) How do atomic number and atomic mass number differ from each other?
- 5) How does an atom absorb and release energy in the form of light?
- 6) What is an isotope?
- 7) What makes an element radioactive?
- 8) How can x-ray diffraction be used to chemically identify an unknown?

## CH 114 Chapter Reading Guide and Study Guide for Exam #2

### Chapter 11 (general)

- 1) What role does the criminalist take in arson investigations?
- 2) What is the goal of searching a fire scene? Is a warrant required? Briefly explain.
- 3) What are the telltale signs of an accelerant-initiated fire?
- 4) How is physical evidence collected at the scene of a suspected arson or explosion?
- 5) What laboratory procedures are used to detect and identify hydrocarbon and explosive residues?
- 6) How are explosives classified?
- 7) What happens to explosive evidence once in the lab? What confirmatory tests are run?
- 8) What are taggants?

### The Chemistry of Fire!!

- 9) Describe in general, the chemistry of fire. What types of substances are required? What gets produced?
- 10) What is energy? List several different types of energy. What role does energy play in a chemical reaction?
- 11) What is the difference between an exothermic reaction and an endothermic reaction? Which type of reaction does this chapter focus on?
- 12) What is an ignition temperature? Give an example.
- 13) Why is fire described as a chain reaction?
- 14) In order for a reaction to occur what things must happen to the molecules?
- 15) What factors affect the rate of a combustion reaction?
- 16) How do non-gaseous fuels burn?
- 17) What are the three basic ingredients of a flaming fire and what other factor must be considered?

- 18) Can fuels burn without a flame? Briefly explain.
- 19) What is spontaneous combustion?
- 20) Give an example and briefly explain an oxidation reaction not involving oxygen.

## Chapter 12

- 1) What A-B-O antigens and antibodies are found in each type of blood?
- 2) How is whole blood typed?
- 3) What forensic tests are used to characterize a stain as blood?
- 4) How are antigen-antibody interactions applied to species identification and drug identification?
- 5) What are the differences between monoclonal and polyclonal antibodies?
- 6) How are chromosomes and genes different?
- 7) How is a Punnett square used to determine the genotypes and phenotypes of offspring?

## Chapter 13

- 1) What parts make up a nucleotide and how they are linked together to form DNA?
- 2) How does base pairing contribute to the structure of DNA?
- 3) How do DNA strands coding for the production of proteins differ with strands containing repeating base sequences?
- 4) What does PCR stand for and how does it work?
- 5) What new technique is being used to type DNA? How does it work?
- 6) What is the difference between nuclear and mitochondrial DNA?
- 7) How are computerized DNA databases used in criminal investigations?
- 8) What procedures must be followed for the proper preservation of bloodstained evidence for DNA analysis?