Forensics Lesson 6

DNA and Chromatography

Quiz Date:

Vocabulary

**What is DNA?**

* **DNA** stands for **deoxyribonucleic acid** and contains **genetic information.** Itis found on **chromosomes** located in the nucleus of our cells.

**What makes up DNA?**

* The sides or **backbone** of the DNA molecule are made up of **sugar (deoxyribose)** and **phosphate molecules**.
* The rungs that form the middle of the molecule are made up of pairs of **nucleotides** or **nitrogen bases**. **Adenine** (A) pairs with **thymine** (T), while **guanine** (G) always pairs with **cytosine** (C).
* The order of the bases determines the **genetic code**.

**How is DNA used as evidence?**

* Each person’s DNA is **different** from other people (except identical twins).
* DNA collected from a crime scene can either link a **suspect to the evidence** or **eliminate a suspect**, similar to the use of fingerprints.
* DNA **can identify a victim** through DNA from relatives, even when no body can be found.
* DNA can **link crime scenes** together by linking the same perpetrator to different scenes locally, statewide, and across the nation.
* DNA can **place an individual at a crime scene**, in a **home**, or in a **room** where the suspect claimed not to have been.
* DNA can **refute a claim of self-defense** and put a weapon in the suspect's hand.
* It can change a story from an **alibi** to one of **consent**.

**What factors affect DNA evidence?**

* Several factors can affect the DNA left at a crime scene, such as **environmental factors** (e.g., heat, sunlight, moisture, bacteria, and mold).
* Therefore, not all DNA evidence will result in a usable DNA profile. Further, DNA testing cannot identify when the suspect was at the crime scene or for how long.

**What is CODIS?**

* **CODIS** stands for **Combined DNA Index System**, which is an electronic database of DNA profiles that can identify suspects.
* DNA profiles from individuals convicted of certain crimes, such as rape, murder, and child abuse, are entered into CODIS and help officers identify possible suspects when no prior suspect existed.

**Chromatography**

**What is chromatography?**

* **Chromatography** (from Greek word for ***chromos***for colour) is the collective term for a family of laboratory techniques for the separation of mixtures.
* It involves passing a mixture which contains the analyte through a stationary phase, which separates it from other molecules in the mixture and allows it to be isolated.
* Chromatography is the **physical separation** of a mixture into its **individual components**.
* We can use chromatography to separate the components of **inks** and **dyes**, such as those found in pens, markers, clothing, and even candy shells.
* Chromatography can also be used to separate the colored **pigments in plants** or used to determine the **chemical** **composition** of many substances.

**Examples of Chromatography**

**Liquid Chromatography**

* Used to identify unknown plant pigments & other compounds.

**Thin-Layer Chromatography**

* Uses thin plastic or glass trays to identify the composition of pigments, chemicals, and other unknown substances.

**Gas Chromatography**

* Used to determine the chemical composition of unknown substances, such as the different compounds in gasoline.

**Paper Chromatography**

* Can be used to separate the components of inks, dyes, plant compounds (chlorophyll), make-up, and many other substances

**Mixtures & Compounds**

**Mixture** – Two or more substances that are mixed together, but not chemically combined.

**Examples of mixtures ...**
Air – mixture of gases
Bowl of cereal – mixture of cereal and milk
Soda pop – mixture of soda syrup, water, and CO**2** gas
Fog –water suspended in air
Kool-Aid – mixture of water, sugar, and flavor crystals

**Compounds** – Two or more elements that are chemically combined.

**Examples of compounds ...**
Salt –Sodium and chlorine combined chemically
Water –Hydrogen and oxygen combined chemically
Carbon Dioxide – Carbon and oxygen combined chemically

**Solutions**

* Solutions are mixtures in which one substance is dissolved in another.
* Solutions have two parts: solute and solvent
The solute is the substance that is dissolved.
The solvent is the substance that does the dissolving.