

School Name: \_\_\_\_\_

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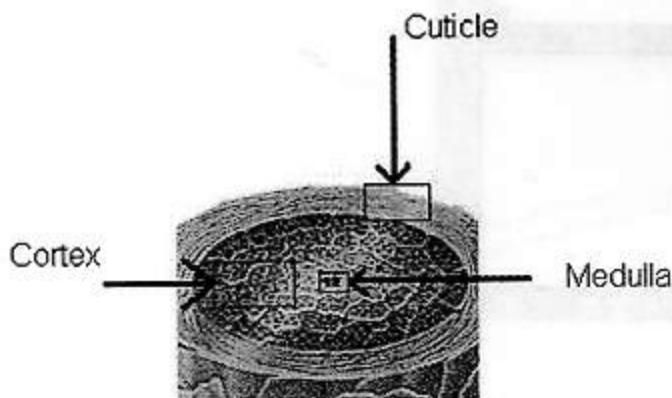
## Supplemental Questions

(20pts)

- 1.) In terms of crime scene investigations, what is luminol useful for? Explain the chemistry of how luminol works.

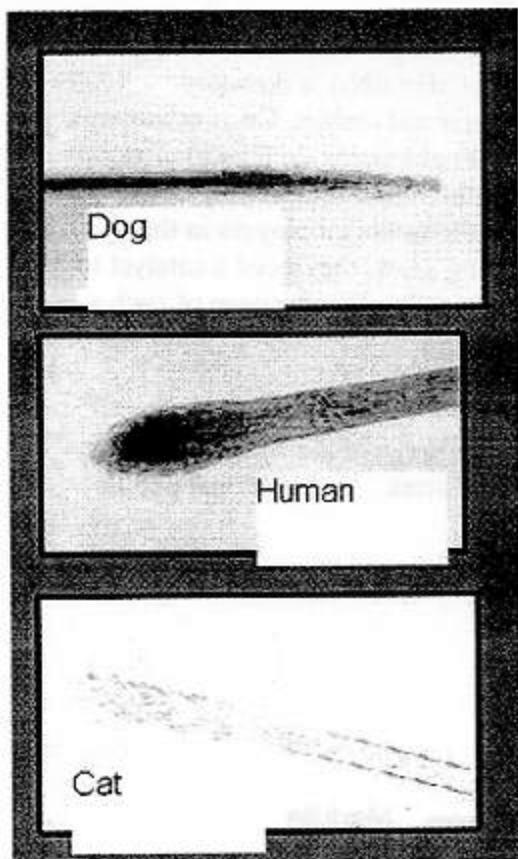
Luminol can be sprayed on a surface and will glow if blood stains are . The central chemical in this reaction is luminol ( $C_8H_7O_3N_3$ ), a powdery compound made up of nitrogen, hydrogen, oxygen and carbon. Criminalists mix the luminol powder with a liquid containing hydrogen peroxide ( $H_2O_2$ ), a hydroxide ( $OH^-$ ) and other chemicals, and pour the liquid into a spray bottle. The hydrogen peroxide and the luminol are actually the principal players in the chemical reaction, but in order to produce a strong glow, they need a catalyst to accelerate the process. The mixture is actually detecting the presence of such a catalyst, in this case the iron in hemoglobin.

- 2.) Label the correct parts of a hair shaft below using **three** of the following terms:  
a.) Medulla    b.) Cuticle    c.) Follicle    d.) Cortex    e.) Dermal papilla



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- 3.) The roots of a hair sample are very distinguishing between human, dog, and cat. Label each of the following pictures of hair roots as either human, dog, or cat. Each choice will be used once.



- 4.) What is the most common blood type?   O<sup>+</sup>    
What is the least common blood type?   AB
- 5.) Which of the following is the "resting phase" for hair growth, during which if a hair is pulled out, it will reveal a solid, dry, white material at the root?  
a.) Catagen    b.) Anagen    c.) Telogen

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- 6.) Write one or two sentences that describes how a gas chromatography device works. Be sure to include the following terms in your description.

**elution time** **mobile phase** **stationary phase** **inert gas** **adsorbant** **mixture**

Gas chromatography is a technique by which a mixture can be separated based on differences in their affinity for an adsorbant stationary phase while being moved through a column by an inert gas which is considered the mobile phase. Substances which show increased affinity for the stationary phase will not travel as quickly through the column and will show an increased elution time. The hope is that these differences in affinity will be great enough to achieve adequate separation.

- 7.) Complete the following chart by entering "yes" or "no" in each box.

ABO Blood Type	Antigen A	Antigen B	Antibody Anit-A	Antibody Anti-B
A	Yes	No	No	Yes
B	No	Yes	Yes	No
O	No	No	Yes	Yes
AB	Yes	Yes	No	No

- 8.) Answer each of the following as true or false.

a.) There is no established link between the fingerprint patterns of a child and that of their parents.   F  

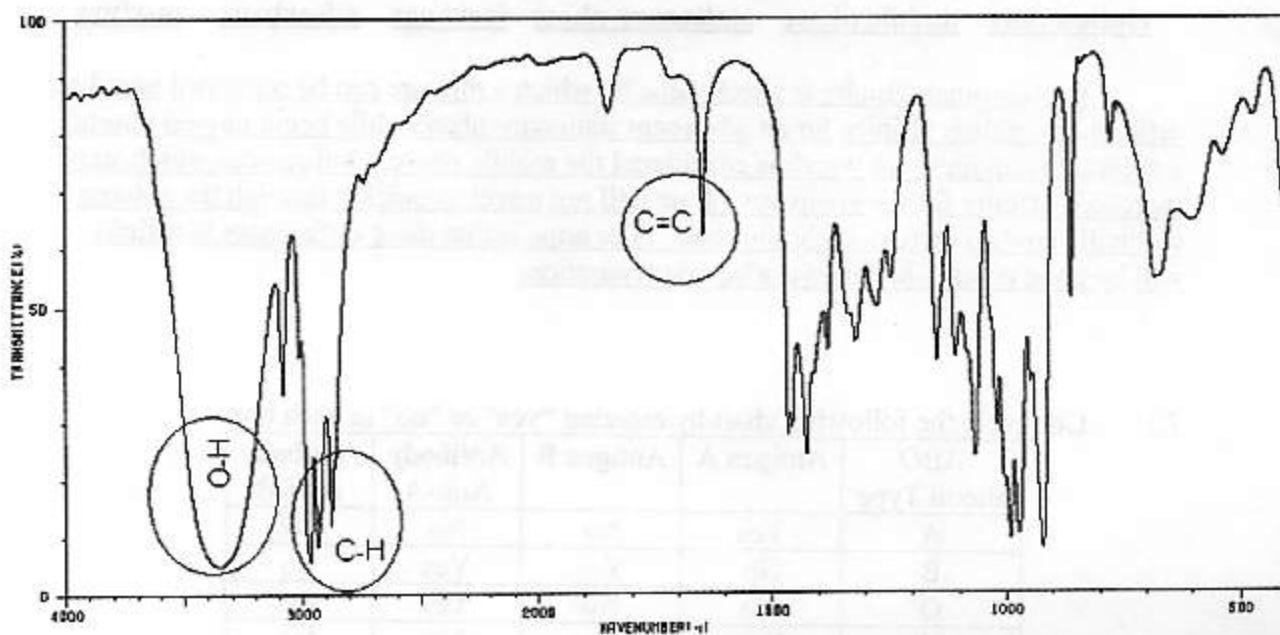
b.) There is no known method of determining the age of a latent print.   T  

c.) A ridge that is thinner and shallower than those surrounding it may be termed "incipient".   T  

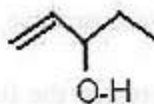
d.) The fingerprinting acronym ACE-V stands for "analyze, collect, evaluate, and verify."   F

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9.)



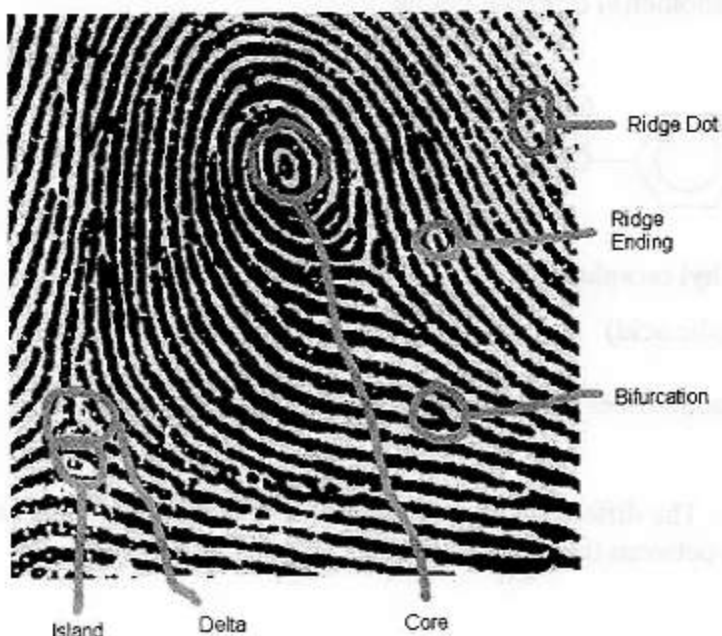
Which of the following molecules could be represented by the IR spectra above?



In the IR spectra, circle the three most important signals and label what type of chemical bond they come from.

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10.)



Identify the type of fingerprint seen above. Loop

If possible, circle and identify each of the following characteristics that can be found on the above print. (Some may not be included on this print.)

- Ridge ending
- Bifurcation
- Island
- Ridge dot
- Core
- Delta

What is the ridge count of the above print? 17

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11.) Draw the monomer(s) of PETE below.



This is ethylene glycol

This is dimethyl terephthalate.

(Or terephthalic acid)

Is PETE an addition or condensation polymer? Condensation

True or false: The difference between HDPE and LDPE is in the amount of crosslinking between the polymer chains. F

12.) From the following list of polymers, circle those which are thermoplastics.

PETE

PVC

PS

PP

PC

LDPE

PMMA

HDPE