Ch 14 CW/HW – Arson Investigations

Name:

Answer each question completely.

1. If combustion is to be initiated and sustained, all of the following elements must be present except
   1. The presence of a fuel.
   2. The availability of oxygen.
   3. The application of heat.
   4. The elimination of carbon monoxide.
2. Most arson fires are started with
   1. Lead based paints.an oxidizing agent.
   2. Petroleum based accelerants.
   3. High unsaturated oils.
3. The quantity of heat from a chemical reaction comes from
   1. The breaking and formation of chemical bonds.
   2. The presence of oxygen in the reaction.
   3. The emission of radiation.
   4. The composition of the furl-air mix.
4. A search of the fire scene must focus on
   1. Collecting trace evidence for later chemical analysis.
   2. Estimating the value of monetary loss.
   3. Ascertaining whether or not a crime has been committed.
   4. Finding the fire’s origin.
5. A gas chromatograph identifies an accelerant by a chromatogram’s
   1. Length.
   2. Size.
   3. Pattern.
   4. Peak shape.
6. What is oxidation?
7. What is combustion?
8. How does an exothermic reaction differ from an endothermic reaction?
9. A fire will burn until either of which two components is exhausted?
10. Name two factors that influence the speed of reaction of a fire.
11. In what physical state must a fuel exist in order to produce combustion when it reacts with oxygen? Why must it be in this state?
12. How high must the temperature of a liquid fuel be before the fuel will burn? What is the term for the lowest temperature at which this occurs?
13. What is pyrolysis? How does pyrolysis produce fire?
14. How does the fuel-air mix affect combustion?
15. Define and give two examples of glowing combustion.
16. Define spontaneous combustion and give two examples of conditions under which it may occur.
17. What three requirements must be satisfied to initiate and sustain combustion?
18. List and define the mechanisms of heat transfer.
19. What is an insulator? Give an example of a good insulator.
20. List three common signs of arson at a fire scene.
21. Name three reasons why arson investigators must work quickly to collect evidence at a fire scene.
22. What are streamers? What does evidence of their presence at a fire scene suggest?
23. Why should fire evidence be packaged in airtight containers?
24. What instrument do most criminalists consider the most sensitive and reliable for detecting and characterizing flammable residues?
25. What is headspace? How is it recovered?
26. What is the main advantage of vapor concentration over the headspace technique?
27. It is late August in Houston, Texas, and you are investigating a fire that occurred at a facility that stores motor oils and other lubricating oils. A witness points out a man who allegedly ran from the structure about the same time that the fire started. You question the man, who turns out to be the owner of the facility. He tells you that he was checking his inventory when barrels of waste motor oil stored in an unventilated back room spontaneously burst into flames. The owner claims that the fire spread so rapidly that he had to flee the building before he could call 911. After speaking with several employees, you learn that the building has no air conditioning and that the oil had been stored for almost a year in the cramped back room. You also learn from a detective assisting on the case that the owner increased his insurance coverage on the facility within the past three months. Should you believe the owner’s story, or should you suspect arson? Upon what do you base your conclusion?
28. Criminalist Mick Mickelson is collecting evidence from a fire scene. He gathers about a quart of ash and soot debris collected from the several rooms surrounding the point of origin. He stored the debris in a new, clean paint can, filled about three-quarters full. Seeing several pieces of timber that he believes may contain accelerant residues, he cuts them and places them in airtight plastic bags. A short time later, a suspect is arrested and Mick searches him for any signs of an igniter or accelerants. He finds a cigarette lighter on the suspect and seizes it for evidence before turning the suspect over to the police. What mistakes, if any, did Mack make in collecting evidence?