

Chapter 3 Test

Name: _____ Date: _____

Directions: Write the correct letter on the blank before each question.

Objective 1:

Describe the various components of fire behavior.

- _____ 1. Which of the following statements about a physical change is MOST accurate? (74)
- A. A physical change does not involve an exchange of energy.
 - B. A physical change is accompanied by some type of chemical change.
 - C. The substance undergoes chemical changes that affect size, shape, or appearance.
 - D. The substance remains chemically the same but changes in size, shape, or appearance.
- _____ 2. Which of the following is MOST correct about what occurs in a chemical reaction? (75)
- A. A chemical reaction occurs very slowly.
 - B. A chemical reaction only involves one substance.
 - C. A substance changes in size, shape, or appearance.
 - D. A substance changes from one type of matter into another.
- _____ 3. Which occurs with rapid oxidation? (75)
- A. Rust
 - B. Combustion
 - C. Smoldering
 - D. Vaporization
- _____ 4. Reactions that give off energy are called: (75)
- A. kinetic.
 - B. exothermic.
 - C. endothermic.
 - D. active reactions.

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- _____ 5. Converting water from a liquid to a gas requires: (75)
- A. a kinetic reaction.
 - B. an active reaction.
 - C. an exothermic reaction.
 - D. an endothermic reaction.
- _____ 6. Which of the following is a characteristic of nonflaming combustion? (76)
- A. Occurs when oxygen content is lower
 - B. Occurs when oxygen content is higher
 - C. Occurs more slowly at a lower temperature
 - D. Occurs more slowly at a higher temperature
- _____ 7. Which of the following is a characteristic of flaming combustion? (76)
- A. Smoldering glow on the material's surface
 - B. Visible flames above the material's surface
 - C. Single color smoke above the material's surface
 - D. Puffs of black or gray smoke above the material's surface
- _____ 8. Which of the following would extinguish a fire under the simplest model of fire behavior? (76)
- A. Addition of oxygen
 - B. Removal of oxygen
 - C. Addition of solubles
 - D. Removal of pathways
- _____ 9. Which element was added to the basic fire model to create the fire tetrahedron? (76)
- A. Fuel
 - B. Heat
 - C. Oxygen
 - D. Uninhibited chemical reaction
- _____ 10. Which of the following is a chemical process that requires liquid or solid fuels to be vaporized or converted to the gas phase through the addition of heat? (77)
- A. Flaming combustion
 - B. Primary combustion
 - C. Nonflaming combustion
 - D. Secondary combustion

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- _____ 11. Which of the following is a measure of the average kinetic energy of the particles in a sample of matter? (78)
- A. Heat
 - B. Energy
 - C. Temperature
 - D. Compression
- _____ 12. Energy possessed by a moving object is known as: (78)
- A. actual energy.
 - B. kinetic energy.
 - C. primary energy.
 - D. potential energy.
- _____ 13. Which of the following refers to the rate at which work is performed or energy is converted from one form to another? (78)
- A. Work
 - B. Force
 - C. Power
 - D. Transmission
- _____ 14. The energy that transfers from a high-temperature substance to a low-temperature substance is referred to as: (78)
- A. hot energy.
 - B. active energy
 - C. thermal energy.
 - D. potential energy.
- _____ 15. Which type of ignition occurs when a mixture of fuel and oxygen encounter an external heat source with sufficient heat or thermal energy to start the combustion process? (79)
- A. Autoignition
 - B. Kinetic ignition
 - C. Piloted ignition
 - D. Primary ignition
- _____ 16. Which of the following statements about the autoignition temperature of a substance is MOST accurate? (80)
- A. It is always lower than its piloted ignition temperature.
 - B. It is always higher than its piloted ignition temperature.
 - C. It is always the same as its piloted ignition temperature.
 - D. It may be either higher or lower than its piloted ignition temperature.

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- _____ 17. Which of the following refers to unintended resistance heating? (81)
- A. Arcing
 - B. Sparking
 - C. Smoldering
 - D. Overcurrent or overload
- _____ 18. Which of the following refers to a high-temperature luminous electric discharge across a gap or through a medium such as charred insulation? (81)
- A. Arcing
 - B. Sparking
 - C. Smoldering
 - D. Overcurrent or overload
- _____ 19. Which source of heat is generated by friction or compression? (82)
- A. Light energy
 - B. Chemical energy
 - C. Electrical energy
 - D. Mechanical energy
- _____ 20. Insulating materials delay heat transfer primarily by: (84)
- A. slowing convection.
 - B. slowing conduction.
 - C. increasing conduction.
 - D. increasing convection.
- _____ 21. Which type of heat transfer involves the transfer of thermal energy by the circulation or movement of a fluid (liquid or gas)? (84)
- A. Radiation
 - B. Convection
 - C. Conduction
 - D. Transmission
- _____ 22. Which type of heat transfer involves the transmission of energy as electromagnetic waves without an intervening medium? (84)
- A. Radiation
 - B. Convection
 - C. Conduction
 - D. Penetration

- _____ 23. Gypsum board is an example of a: (87)
- A. passive agent.
 - B. blocking agent.
 - C. nonreactive agent.
 - D. conductive agent.
- _____ 24. Which of the following is known as the reducing agent in a combustion reaction? (87)
- A. Fuel
 - B. Heat
 - C. Oxygen
 - D. Inert gases
- _____ 25. Which is an example of a hydrocarbon-based fuel? (87)
- A. Paper
 - B. Wood
 - C. Plastics
 - D. Gypsum board
- _____ 26. Which of the following refers to the total amount of thermal energy released when a specific fuel amount is oxidized? (87)
- A. Heat release rate
 - B. Heat of reactivity
 - C. Heat of combustion
 - D. Realized heat energy
- _____ 27. Which of the following refers to energy released per unit of time as a fuel burns? (88)
- A. Heat release rate
 - B. Heat of reactivity
 - C. Heat of combustion
 - D. Realized heat energy
- _____ 28. Why are fuels such as methane, hydrogen, and acetylene considered some of the most dangerous of all fuel types? (89)
- A. They are odorless and colorless.
 - B. They are unstable under all circumstances.
 - C. There is no way to know their flammability ranges.
 - D. They are already in the physical state required for ignition.

- _____ 29. Which of the following statements about vapor density is MOST accurate? (89)
- A. All gases are given a vapor density of 1.
 - B. Gases with a vapor density less than 1 will rise.
 - C. Gases with a vapor density greater than 1 will rise.
 - D. Gases may either rise or sink regardless of vapor density.
- _____ 30. Water has a specific gravity of: (90)
- A. 0.
 - B. 1.
 - C. less than 1.
 - D. greater than 1.
- _____ 31. Which of the following statements about liquids with a specific gravity of less than 1 is MOST accurate? (90)
- A. They will sink in water.
 - B. They will readily mix with water.
 - C. They may either float or sink in water.
 - D. They will float on the surface of water.
- _____ 32. What is the minimum temperature at which a liquid gives off sufficient vapors to ignite but not sustain combustion? (90)
- A. Fire point
 - B. Flash point
 - C. Vapor point
 - D. Flame point
- _____ 33. What is the temperature at which sufficient vapors are generated to sustain the combustion reaction? (90)
- A. Fire point
 - B. Flash point
 - C. Vapor point
 - D. Flame point
- _____ 34. Which of the following is a characteristic of polar solvents? (91)
- A. They react with water.
 - B. They will sink in water.
 - C. They will not mix with water.
 - D. They will mix readily with water.

- _____ 35. In solid fuels, what must occur to generate the flammable vapors required for combustion? (91)
- A. Pyrolysis
 - B. Flame over
 - C. Ventilation
 - D. Autoignition
- _____ 36. Air contains approximately: (92)
- A. 14 percent oxygen.
 - B. 21 percent oxygen.
 - C. 33 percent oxygen.
 - D. 50 percent oxygen.
- _____ 37. Which of the following statements about oxidizers is MOST accurate? (94)
- A. Oxidizers are combustible and highly volatile.
 - B. Oxidizers are neutral and do not affect combustion.
 - C. Oxidizers are combustible and also support or enhance combustion.
 - D. Oxidizers are not combustible but they will support or enhance combustion.
- _____ 38. Materials that burn readily in oxygen-enriched atmospheres: (94)
- A. may not burn in normal oxygen levels.
 - B. generally flame out within several minutes.
 - C. tend to smolder and not create combustion.
 - D. will also always burn at normal oxygen levels.
- _____ 39. What is the minimum concentration of fuel vapor and air that supports combustion? (94)
- A. Minimum flash point
 - B. Maximum flash point
 - C. Upper flammable limit
 - D. Lower flammable limit
- _____ 40. What is the concentration fuel vapor and air above which combustion cannot take place? (94)
- A. Minimum flash point
 - B. Maximum flash point
 - C. Upper flammable limit
 - D. Lower flammable limit

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- _____ 41. In a self-sustained chemical reaction, the combustion of methane produces the toxic gases carbon monoxide and: (96)
- A. radon.
 - B. hydrogen.
 - C. formaldehyde.
 - D. carbon dioxide.
- _____ 42. Which of the following causes the largest percentage of fire deaths? (96)
- A. Burns
 - B. Toxic smoke
 - C. Cardiac arrests
 - D. Injuries during escape attempts
- _____ 43. The primary method of extinguishment for _____ fires is cooling with water to reduce the temperature of the fuel. (96)
- A. Class A
 - B. Class B
 - C. Class C
 - D. Class D
- _____ 44. Which type of fire requires foam/dry chemical as an extinguishing agent? (96)
- A. Class A
 - B. Class B
 - C. Class C
 - D. Class D
- _____ 45. Which type of fire involves energized electrical equipment such as computers or electric motors? (98)
- A. Class A
 - B. Class B
 - C. Class C
 - D. Class D
- _____ 46. What type of materials are MOST likely to react violently with water or other extinguishing agents? (98)
- A. Class A
 - B. Class C
 - C. Class D
 - D. Class K

- _____ 47. Which type of fire consists of vegetable-based oils and greases found in commercial kitchens? (98)
- A. Class A
 - B. Class C
 - C. Class D
 - D. Class K

Objective 2:
Describe fire development.

- _____ 48. Which of the following statements about combustible materials with high surface-to-mass ratios is MOST accurate? (99)
- A. They ignite but flame out quickly.
 - B. They are easily ignited and burn quickly.
 - C. They are difficult to ignite and burn slowly.
 - D. The surface-to-mass ratio has no effect on burning.
- _____ 49. Which of the following statements about fires originating in upper levels of a building is MOST accurate? (101)
- A. They generally stay contained to upper levels.
 - B. They generally extend downward very quickly.
 - C. They are more unpredictable in their behavior.
 - D. They generally extend downward much more slowly.
- _____ 50. In a compartment fire that involves the contents of the room, fire development is limited by the available air supply and is said to be: (102)
- A. self-containing.
 - B. ventilation controlled.
 - C. a limited capacity fire.
 - D. a reducing oxygen fire.
- _____ 51. Which of the following thermal properties of a compartment contains heat within the compartment, causing a localized increase in the temperature and fire growth? (102)
- A. Fuel load
 - B. Insulation
 - C. Retention
 - D. Heat reflectivity

- _____ 52. Which of the following statements about fuel load is MOST accurate? (102)
- A. Fuel load cannot be accurately estimated.
 - B. Fuel load does not change within an occupancy.
 - C. Fuel load for occupancies can be absolutely determined.
 - D. Fuel load can be estimated using mathematical equations.
- _____ 53. What stage of fire growth is largely dependent on the characteristics and configuration of the fuel involved (fuel-controlled fire)? (103)
- A. Decay
 - B. Growth
 - C. Incipient
 - D. Fully developed
- _____ 54. During which stage does fire begin to influence the environment within the compartment? (104)
- A. Decay
 - B. Growth
 - C. Incipient
 - D. Fully developed
- _____ 55. Which of the following statements about thermal layering is MOST accurate? (104)
- A. Generally, the cooler gases form the upper layer.
 - B. Generally, the cooler gases gravitate to the middle.
 - C. Generally, the hottest gases tend to be in the lower layers.
 - D. Generally, the hottest gases tend to be in the upper layers.
- _____ 56. The rapid transition from growth stage to fully developed is known as: (106)
- A. roll over.
 - B. backdraft.
 - C. flashover.
 - D. complete combustion.
- _____ 57. Which of the following statements about fires that develop beyond the incipient stage is MOST accurate? (107)
- A. They result in roll over.
 - B. They result in backdraft.
 - C. They become fuel controlled.
 - D. They become ventilation controlled.

- _____ 58. During what stage are flammable products of combustion likely to flow from the compartment of origin into adjacent compartments? (108)
- A. Decay
 - B. Growth
 - C. Incipient
 - D. Fully developed
- _____ 59. During what stage will flames extend out of the compartment openings because there is insufficient oxygen for complete combustion in the compartment? (108)
- A. Decay
 - B. Growth
 - C. Incipient
 - D. Fully developed
- _____ 60. What stage occurs as the fire consumes the available fuel in the compartment and the heat release rate begins to decline? (108)
- A. Decay
 - B. Growth
 - C. Incipient
 - D. Fully developed