



# Hazardous Materials Operations 1

Pre service firefighter education and training (Lambton College of Applied Arts and Technology)

## Multiple Choice

1. What is the approximate flash point of diesel fuel?

- A. 49°C to 60°C (120°F to 140°F)
- B. 60°C to 71°C (140°F to 160°F)
- C. 71°C to 82°C (160°F to 180°F)
- D. 82°C to 93°C (180°F to 200°F)

Answer: A

2. Which signal word on the label of a bag of pesticide means that the product is moderately toxic?

- A. Caution
- B. Danger
- C. Warning
- D. Poison

Answer: C

3. Normal temperature and pressure (NTP) for vapour pressures assume a standard ambient temperature of:

- A. 0°C (32°F).
- B. 20°C (68°F).
- C. 70°C (158°F).
- D. 100°C (212°F).

Answer: B

4. \_\_\_\_\_ is to liquids as vapour density is to gases.

- A. Specific gravity
- B. Volatility
- C. Viscosity
- D. Molecular weight

Answer: A

5. Corrosive chemicals used in general industry can be categorized into what two classes?

- A. Polars and nonpolars
- B. Chlorine-based and hydrogen-based corrosives
- C. Acids and bases
- D. Liquids and solids

Answer: C

6. At what pH is a substance neither acidic nor basic?

- A. 0
- B. 1
- C. 7
- D. 15

Answer: C

7. Which of the following is the best example of secondary contamination?

- A. Exposure to alpha radiation from broken transport packaging
- B. Contact occurring during operations by emergency personnel to resolve the incident
- C. Contact with material outside of its containment vessel or packaging
- D. Contact with tools and equipment used to control a leak

Answer: D

8. Flammable liquids with low boiling points are dangerous because:

- A. a relatively low temperature can start the liquid boiling.
- B. once one of these substances begins to boil, it is very difficult to make it stop.
- C. a low boiling point translates into a tendency for early explosion in a fire.
- D. they may produce large volumes of flammable vapour at relatively low temperatures.

Answer: D

9. What is the temperature at which a flammable liquid will ignite without the need for an external ignition source?

- A. Fire point
- B. Flash point
- C. Self-sustaining temperature
- D. Ignition temperature

Answer: D

10. How would a fuel/air mixture in which there is not enough fuel be described?

- A. Too fuel rich
- B. Starved
- C. Too fuel lean
- D. Preignited

Answer: C

11. What characteristic of a gas is quantified as its vapour density?

- A. Its tendency to dissipate in open air
- B. Its weight relative to air
- C. How much moisture it contains
- D. How thickly it boils

Answer: B

12. What is the vapour density of air?

- A. 14.7
- B. 3.1
- C. 1.7
- D. 1

Answer: D

13. What does the letter C stand for in 4H MEDIC ANNA?

- A. Contain
- B. Carbon dioxide
- C. Casualties
- D. Carbon monoxide

Answer: D

14. What quantity is the weight of a liquid as compared to an equal volume of water?

- A. Vapour density
- B. Atmospheric pressure
- C. Specific gravity
- D. Buoyancy

Answer: C

15. What is the specific gravity of water?

- A. 10
- B. 7
- C. 1
- D. 0

Answer: C

16. What term refers to the ability of a material to cause damage on contact to skin, eyes, or other body parts?

- A. Organicity
- B. Volatility
- C. Corrosivity
- D. Reactivity

Answer: C

17. Which of the following pH values would indicate a strong acid?

- A. 9.5
- B. 7.0
- C. 6.3
- D. 1.7

Answer: D

18. \_\_\_\_\_ is one toxic chemical found in most smoke caused by fire.

- A. Sodium
- B. Xenon
- C. Cyanide
- D. Acetic acid

Answer: C

19. Which of the following is a type of radiation?

- A. Omega
- B. Delta
- C. Alpha
- D. Theta

Answer: C

20. The \_\_\_\_\_ of matter defines a substance as a liquid, solid, or gas.

- A. size
- B. state
- C. shape
- D. pH

Answer: B

21. A change in the state of a material is known as a \_\_\_\_\_ change.

- A. physical
- B. chemical
- C. property
- D. matter

Answer: A

22. The alteration of the molecular nature of a material is known as a \_\_\_\_\_ change.

- A. physical
- B. chemical
- C. property
- D. matter

Answer: B

23. What is the boiling point of water?

- A. 50°C (122°F)
- B. 75°C (167°F)
- C. 100°C (212°F)
- D. 150°C (302°F)

Answer: C

24. What is the standard atmospheric pressure at sea level?

- A. 6.9 kPa (1 psi)
- B. 45 kPa (6.5 psi)
- C. 82.7 kPa (12 psi)
- D. 101.4 kPa (14.7 psi)

Answer: D

25. During a fire, a wooden beam falls and breaks open a container, causing it to leak its contents out onto the floor. Which type of stress caused the container to fail?

- A. Mechanical
- B. Thermal
- C. Radioactive
- D. Chemical

Answer: A

26. What is the temperature at which a liquid fuel gives off sufficient vapour such that when an ignition source is present the vapours will ignite?

- A. Flammable range
- B. Flash point
- C. Fire point
- D. Ignition temperature

Answer: B

27. What is the temperature at which sustained combustion will occur?

- A. Flammable range
- B. Flash point
- C. Fire point
- D. Ignition temperature

Answer: C

28. Which term is an expression of a fuel/air mixture, defined by upper and lower limits, that reflects an amount of flammable vapour mixed with a given volume of air?

- A. Flash point
- B. Vapourization range
- C. Flammable range
- D. Combustible limit

Answer: C

29. What is the flash point of gasoline?

- A. -43°C (-45°F)
- B. 5°C (41°F)
- C. 43°C (109°F)
- D. 105°C (221°F)

Answer: A

30. Liquids with low flash points tend to have:

- A. lower vapour pressures and lower ignition temperatures.
- B. higher vapour pressures and higher ignition temperatures.
- C. lower vapour pressures and higher ignition temperatures.
- D. higher vapour pressures and lower ignition temperatures.

Answer: B

31. What will gasoline or diesel fuel do when water is applied?

- A. Mix
- B. Sink to the bottom
- C. Float to the top
- D. Separate

Answer: C

32. What is the term for the ability of a substance to dissolve in water?

- A. Water formulation
- B. Water corrosivity
- C. Chemical solubility
- D. Water solubility

Answer: D

33. What is used as a measurement of the corrosive strength of a substance?

- A. Corrosivity index
- B. pH
- C. Sed rate
- D. Partial pressure

Answer: B

34. Which particle has a positive charge?

- A. Electron
- B. Photon
- C. Proton
- D. Neutron

Answer: C



35. What type of electrical charge does a neutron have?

- A. Negative
- B. Positive
- C. Sometimes negative, sometimes positive
- D. No charge at all

Answer: D

36. Which particle has a negative electrical charge?

- A. Electron
- B. Photon
- C. Proton
- D. Neutron

Answer: A

37. \_\_\_\_\_ refers to the process in which unstable atoms of an element decay to a different state and emit excess energy in the form of particles or waves.

- A. Electromagnetism
- B. Radioactivity
- C. Covalence
- D. Molecular decomposition

Answer: B

38. Which is the most energetic type of radiation responders may encounter?

- A. Alpha
- B. Beta
- C. Gamma
- D. Photon

Answer: C

39. What is the term for the process by which people, animals, the environment, and equipment are subjected to contact with a hazardous material?

- A. Contamination
- B. Risk
- C. Hazard
- D. Exposure

Answer: D

40. A person develops asbestosis after repeated exposures to asbestos over 20 years. This is an example of a(n) \_\_\_\_\_ health effect.

- A. acute
- B. sensitized
- C. prolonged
- D. chronic

Answer: D

41. Damage to a person's skin, resulting from exposure to sulfuric acid, is an example of a(n) \_\_\_\_\_ health effect.

- A. acute
- B. persistent
- C. recurring
- D. chronic

Answer: A

42. The LC<sub>50</sub> applies to materials in the \_\_\_\_\_ state.

- A. solid
- B. suspended
- C. liquid
- D. gaseous

Answer: D

43. Which type of radiation is emitted as pure electromagnetic energy?

- A. Alpha
- B. Beta
- C. Gamma
- D. Neutron

Answer: C

44. The minimum temperature at which a fuel, when heated, will ignite in the presence of air and continue to burn is called the:

- A. flash point.
- B. ignition temperature.
- C. flammable range.
- D. fire point.

Answer: B

45. In order for a gasoline/air mixture to cause a flash fire when exposed to an ignition source, it must:

- A. fall between the lower and upper explosive limits.
- B. fall below the lower explosive limit.
- C. exceed the upper explosive limit.
- D. be equal to either the lower or upper explosive limit.

Answer: A

46. The vapours released from the surface of any liquid must be \_\_\_\_\_ if they are to exert pressure.

- A. released
- B. contained
- C. heated
- D. cooled

Answer: B

47. 101.4 kPa (14.7 psi) is equivalent to \_\_\_\_\_ torr.

- A. 1
- B. 19.6
- C. 760
- D. 972

Answer: C

48. How would a fuel/air mixture in which there is too much fuel be described?

- A. Too fuel lean
- B. Condensed
- C. Too fuel rich
- D. Saturated

Answer: C

Complexity: Moderate

49. What does it mean if a substance's vapour density is 2.3?

- A. It will float in air.
- B. It has a relatively high boiling point.
- C. It has an extraordinarily high boiling point.
- D. It will sink in air.

Answer: D

50. What will a liquid with a specific gravity of 0.7 do in water?

- A. Float on top
- B. Sink to the bottom
- C. Mix
- D. Dissolve

Answer: A

51. What is secondary contamination?

- A. Contamination with a Class II substance or radioactivity
- B. Contamination with small amounts that do not cause harm
- C. Contact with another benign substance
- D. Contamination through direct contact with a contaminated person or object

Answer: D

52. As the molecular weight of a substance increases, the \_\_\_\_\_ decreases.

- A. boiling point
- B. ignition temperature
- C. flash point
- D. heat output

Answer: B

53. When the letters *LD* or *LC* are followed by a number, what does that number indicate?

- A. The average short-term exposure limit
- B. The percentage of test subjects that will die when exposed to a specified amount
- C. The lethal amount for all subjects of a specific test group
- D. The average permissible exposure limit

Answer: B

54. How does the vapour pressure of a liquid relate to its rate of evaporation?

- A. There is no relationship between these two quantities.
- B. Vapour pressure and rate of evaporation are synonymous.
- C. The greater the vapour pressure, the slower a liquid will evaporate.
- D. The greater the vapour pressure, the faster a liquid will evaporate.

Answer: D

55. Most references give the vapour pressures of substances at what temperature?

- A. 10°C (50°F)
- B. 20°C (68°F)
- C. 30°C (86°F)
- D. 50°C (122°F)

Answer: B

56. What term describes the volume increase that occurs when a liquefied gas changes to a gas?

- A. Off-gassing
- B. Liquefaction
- C. Expansion ratio
- D. Vapour pressure

Answer: C

57. What is the term for a catastrophic failure of a pressurized cylinder of liquid?

- A. BEDEL
- B. PLUME
- C. CLOPE
- D. BLEVE

Answer: D

58. Which substance found in fire smoke is a deep lung irritant?

- A. Cyanide
- B. Carbon monoxide
- C. Nitrous oxide
- D. Formaldehyde

Answer: C

59. The variation in the number of \_\_\_\_\_ in an element creates a radioactive isotope of the element.

- A. electrons
- B. photons
- C. protons
- D. neutrons

Answer: D

60. How far can alpha particles travel from the nucleus of the atom?

- A. Less than a few centimetres (about an inch or less)
- B. Up to 1 m (3.3 ft)
- C. Up to 5 m (16.4 ft)
- D. 10 m (32.8 ft) or more

Answer: A

61. 101.4 kPa (14.7 psi) is equivalent to \_\_\_\_\_ atm.

- A. 0.5
- B. 1
- C. 386
- D. 760

Answer: B

62. Radiation that breaks chemical bonds is called \_\_\_\_\_ radiation.

- A. non-polarizing
- B. polarizing
- C. non-ionizing
- D. ionizing

Answer: D

63. When a chemical has been released and physically comes in contact with people, the environment, and everything around it, either intentionally or unintentionally, the residue of that chemical is called:

- A. contamination.
- B. corrosive.
- C. radiation.
- D. polymerization.

Answer: A

64. A(n) \_\_\_\_\_ is a material that can cause severe skin and/or respiratory responses in a sensitized person after exposure to a very small amount of the material.

- A. carcinogen
- B. infectious substance
- C. sensitizer
- D. toxin

Answer: C

65. 101.4 kPa (14.7 psi) is equivalent to \_\_\_\_\_ mm Hg.

- A. 0.5
- B. 1
- C. 386
- D. 760

Answer: D