U.S.C.G. Merchant Marine Exam

First Assistant Engineer

Q516 Engineering Safety & Environmental Protection

(Sample Examination)

Choose the best answer to the following Multiple-Choice Questions:

1. Your vessel has just been struck by another vessel. After meeting with the captain and chief mate, you have immediately ordered the vessel specific damage control procedures in the vessel's approved stability booklet to be enacted. Which of the following statements is true?

   A. The vessel general arrangement plan would be a critical reference document for your response providing accurate data showing watertight compartments, closures, vents and downflooding angles.
   B. The universal station billet assigning crew member responsibilities will provide adequate reference information to determine the adequate damage control response.
   C. The Certificate of Documentation issued to the vessel will be the primary reference document in order to calculate free surface corrections.
   D. The Safety Management System will provide an IMO standard response for all collision response procedures, including damage control.

   Correct answer: A

2. The wooden shoring shown in the illustration is bearing against the hatch coaming and is supporting a load in the direction indicated by the arrows. Which of the following statements is correct for this condition? Illustration SF-0018

   A. Shore "A" will support the greatest load.
   B. Shore "A" will not slip under load.
   C. Shore "B" will support the load without it cracking.
   D. Shore "B" will crack at the pointed end.

   Correct answer: C

3. While maneuvering up the East River your vessel runs aground. As the chief engineer of the vessel how would you proceed?

   A. Call your port engineer.
   B. Wait until the vessel docks to sound the fuel oil tanks.
   C. Switch the saltwater cooling suction to the low sea suction.
   D. Sound all fuel oil tanks and inspect the engine room bilges and void spaces.

   Correct answer: D

4. It is generally not advisable to drive a wedge into a crack occurring in the hull because wedges _____.

   A. will work loose
   B. will pull through the plating
   C. tend to open the crack
   D. will splinter

   Correct answer: C

5. In a compartment that has been completely flooded with water, the greatest pressure will be exerted _____.

   A. at a point that is one-third from the bottom of the bulkhead
   B. along the bottom of any bulkhead
   C. at the vertical center of the bulkhead
   D. along the top of the bulkhead

   Correct answer: B

6. The safe and efficient use of the facepiece of a self-contained breathing apparatus is directly influenced by _____.

   A. the stowing of the facepiece
   B. the maintenance of the facepiece
   C. the donning of the facepiece
   D. all of the above

   Correct answer: D

7. Life jackets should be stowed in _____.

   A. the forepeaks
   B. the pumproom
   C. readily accessible spaces
   D. locked watertight containers

   Correct answer: C

8. Which of the following is required to be included in the fireman's (emergency) outfit?

   A. Chemical protection face shield
   B. Approved work vest
   C. Self-contained breathing apparatus
   D. 5 cell approved flashlight

   Correct answer: C

9. Which of the following statements is true concerning an immersion suit and its use?

   A. Only a light layer of clothing may be worn underneath.
   B. They provide sufficient flotation to do away with the necessity of wearing a life jacket.
   C. They should be tight fitting.
   D. A tear in the suit will not appreciably reduce its value.

   Correct answer: B

10. In order to retrieve an inflatable life raft and place it on deck, you should heave on the _____.

   A. lifelines
   B. righting strap
   C. Sea anchor
   D. towing bridle

   Correct answer: D

11. When a rescue vessel approaches a survival craft in heavy seas, the person in charge of the survival craft should _____.

   A. tie up to the rescue vessel
   B. transfer only those personnel who are not seasick
   C. wait for calmer weather before transferring personnel
   D. transfer all personnel immediately

   Correct answer: C

12. Which of the following conditions represents the appropriate time for setting off distress flares and rockets?

    A. Only when there is a chance of them being seen by rescue vessels
    B. At half-hour intervals
    C. At one-hour intervals
    D. Immediately upon abandoning the vessel

    Correct answer: A

13. The upper explosive limit (UEL) of a mixture of flammable vapors and air is defined as _____.

    A. that concentration above which there is just enough flammable vapor to produce an explosion
    B. that concentration above which the mixture is too rich to burn
    C. the percentage of flammable vapor by volume in air sufficient to create an explosion
    D. the percentage of oxygen present in the air sufficient to support combustion

    Correct answer: B

14. To prevent the spread of fire by convection you should _____.

    A. shut off electrical power
    B. remove combustibles from direct exposure
    C. cool the bulkhead around the fire
    D. close all openings to the area

    Correct answer: D

15. Hazardous conditions exist which may result in spontaneous combustion when _____.

    A. powdered aluminum is stowed dry
    B. oil-soaked rags are stowed in the machine shop
    C. dry metal turnings accumulate
    D. all of the above

    Correct answer: B

16. If the items shown in the illustration are burning, this fire would be a Class _____. Illustration SF-0001

    A. "A"
    B. "B"
    C. "C"
    D. "D"

    Correct answer: A

17. A class "D" fire would involve the burning of _____.

    A. diesel oil
    B. dunnage
    C. magnesium
    D. electrical insulation

    Correct answer: C

18. Paints and solvents used aboard a vessel should be _____.

    A. drained into a common container after each use
    B. covered with a fine mesh screen to protect from ignition sources
    C. returned to the paint locker after each use
    D. stowed safely at the work site until work is completed

    Correct answer: C

19. The most likely location for a liquid cargo fire to occur on a tanker would be _____.

    A. in the amidships house
    B. at the main deck manifold
    C. at the vent header
    D. in the pumproom

    Correct answer: D

20. You are reviewing emergency procedures with new crew members. How would you direct them to proceed if they hear the fire and emergency signal on the ship's general alarm or whistle?

    A. Report to their stateroom and wait further instructions.
    B. Report to their assigned duty station as posted on the Station Bill, so an accurate muster can be taken.
    C. Report to the bridge and wait further instructions.
    D. Report directly to the scene of the emergency to help.

    Correct answer: B

21. How would you ensure that your crew is prepared to combat a shipboard fire using ship's equipment?

    A. Have them read a firefighting textbook.
    B. Show crew generic fire training videos.
    C. Conduct required drills, simulating fire conditions and training with ship's equipment.
    D. Check training records, to see if crew members have attended a firefighting training course.

    Correct answer: C

22. Fire detecting systems on merchant vessels may be arranged to sense _____.

    A. rate of temperature rise
    B. ionized particles
    C. smoke
    D. all of the above

    Correct answer: D

23. In preparation for an extended yard period, you are reviewing your ship's plans. You notice several bulkheads are labeled A60. What is indicated by the label A60?

    A. Fire division boundary, A Class, with insulation that will limit temperature rise to below the allowable level for 60 seconds.
    B. Fire division boundary, A Class, with insulation that will limit temperature rise to below the allowable level for 60 minutes.
    C. Materials meeting construction yard specification A60.
    D. Damage stability bulkhead, A Class, with bulkhead strength that will limit flooding for 60 minutes.

    Correct answer: B

24. When an oil fire has been extinguished, the surface of the oil should be kept covered with foam to prevent _____.

    A. air from contacting the oil vapors permitting reignition
    B. spontaneous combustion below the oil surface
    C. toxic fumes from escaping to the surface
    D. boiling of the heated oil

    Correct answer: A

25. The most common cooling agent used for fighting fires on tank vessels is _____.

    A. flue gas
    B. steam smothering
    C. water
    D. carbon dioxide

    Correct answer: C

26. Your chemical tanker was built to the IBC Code and has foam as the main firefighting medium. During one of your safety meetings, you review the properties of foam as an extinguishing agent. Which of the following is a correct statement that would be appropriate to share during the meeting?

    A. Foam will blanket the fire and cut off the supply of oxygen and is therefore perfectly suited to A, B and C class fires.
    B. Foam will blanket the fire and cut off the supply of oxygen and it also provides excellent cooling protection for the firefighters.
    C. Foam will blanket the fire and cut off the supply of oxygen, but it does not provide the best cooling protection for the firefighters.
    D. Foam will blanket the fire and cut off the supply of oxygen, but it does generate toxic vapors that may harm the firefighters.

    Correct answer: C

27. During an inspection of a ship’s storeroom, you find sealed containers of chemicals labeled "potassium bicarbonate" and "potassium chloride". These chemicals are most commonly used aboard ship for _____.

    A. descaling evaporator tubes
    B. engine jacket water treatment
    C. degreasing machinery parts
    D. recharging dry chemical fire extinguishers

    Correct answer: D

28. Which portable fire extinguisher is normally recharged in a shore facility?

    A. Dry chemical (cartridge-operated)
    B. Water (pump tank)
    C. Water (cartridge-operated)
    D. Carbon dioxide

    Correct answer: D

29. The fire extinguishing equipment shown in the illustration is a large _____. Illustration SF-0009

    A. dry chemical hose reel system
    B. light water hose reel system
    C. Halon 1301 hose reel system
    D. CO2 hose reel system

    Correct answer: A

30. If a fire hose is left unattended and under pressure with the nozzle shut off, the fire hose will _____.

    A. burst under pressure
    B. become elongated by 125%
    C. remain motionless
    D. lash about violently

    Correct answer: C

31. Properly stowed fire hose is either faked or rolled into a rack with the _____.

    A. male and female ends connected together to prevent damage
    B. nozzle end arranged to be easily run out to the fire
    C. male end attached to the adjacent fire hydrant
    D. female end available to be quickly connected to the hydrant

    Correct answer: B

32. Why is it essential to introduce CO2 from a fixed fire extinguishing system, into a large engine room, as quickly as possible?

    A. The fire may warp the CO2 piping.
    B. To keep the fire from spreading through the bulkheads.
    C. Carbon dioxide takes a long time to disperse to all portions of a space.
    D. Updraft from the fire tends to carry the CO2 away.

    Correct answer: D

33. Actuating the fixed CO2 system should cause the automatic shutdown of the _____.

    A. supply and exhaust ventilation
    B. mechanical and natural ventilation
    C. fuel supply only
    D. exhaust ventilation only

    Correct answer: A

34. Your ship has a low-pressure carbon dioxide system that covers the engine room. Fire has been reported in the engine room and the decision has been made to dump the carbon dioxide system into the engine room. While following the procedures to release carbon dioxide you find one engine room supply fan damper that will not close. How should you proceed?

    A. Continue the release procedures and dump the carbon dioxide, after the release then try to seal the fan damper opening.
    B. Cover the fan damper opening with burlap bags to slow the flow of air into the engine room and then continue with the release procedures.
    C. Continue the release procedures and dump the carbon dioxide with the damper still open.
    D. Cover the fan damper opening with a plastic tarp to stop the flow of air into the engine room and then continue with the release procedures.

    Correct answer: D

35. While in the engine control room you smell smoke and see it coming from the vent in the main switchboard panel. Which of the many different types of extinguishers, if any, are required to be in that space and why would it be best suited to extinguish this class of fire?

    A. A portable dry chemical extinguisher, as it is the most common type of portable extinguisher found onboard ships.
    B. A portable CO2 extinguisher as it will smother the fire while limiting the clean-up and damage to the area around the fire.
    C. A fixed CO2 system as it will smother the fire while limiting the clean-up and damage to the area around the fire.
    D. No portable extinguisher is required in the engine control room.

    Correct answer: B

36. The most important characteristic of a fire extinguishing agent to be used on electrical fires is for the agent to be _____.

    A. non-conducting
    B. easily removable
    C. flame resistant
    D. wet

    Correct answer: A

37. In fighting a fire in a fuel tank, the FIRST action you should attempt is to _____.

    A. top off the tank to force out all vapors
    B. begin transferring the fuel to other tanks
    C. secure all sources of fresh air to the tank
    D. station someone at the fixed CO2 release controls

    Correct answer: C

38. As an engineer on a tanker, how would you direct the fire team to combat a large cargo space fire?

    A. Use fixed water and foam systems to extinguish the fire.
    B. Use the inert gas system to extinguish the fire.
    C. Use the fixed carbon dioxide system to extinguish the fire.
    D. Open the ullage caps and lower the level in tanks adjacent to the tank on fire.

    Correct answer: A

39. Your vessel is carrying a cargo of Ethyl methacrylate, which has caught fire. Which extinguishing agents should be used?

    A. Water fog, dry chemical, or chemical foam
    B. Water, dry chemical, or chemical foam
    C. Carbon dioxide, dry chemical, or alcohol foam
    D. Carbon dioxide, dry chemical, or chemical foam

    Correct answer: D

40. Your vessel is carrying a cargo of Methyl Ethyl Ketone (MEK), which has caught fire. Which extinguishing agents should be used?

    A. Water fog, dry chemical, or alcohol foam
    B. Carbon dioxide, dry chemical, or water foam
    C. Carbon dioxide, dry chemical, or water fog
    D. Carbon dioxide, dry chemical, or alcohol foam

    Correct answer: D

41. One of the main concerns when fighting a galley fire is _____.

    A. spreading of fire through the engineering space
    B. contaminating food with extinguishing agent
    C. the loss of stability
    D. the igniting of a grease fire in the range hood ventilation system

    Correct answer: D

42. As first engineer you are the senior engineering officer in Emergency Squad #1. The fire alarm sounds, and you report to the muster station where the bridge informs you smoke has been reported coming from the ship's laundry room. What should your first action be?

    A. Help dress out other crew members in fireman's outfit.
    B. Start boundary cooling the area.
    C. Charge the ship's fire main.
    D. Secure power and ventilation to the laundry room and inform the bridge once this is done.

    Correct answer: D

43. According to Coast Guard Regulations The explosive range of methane is 5% to 15% by volume in air. This means a vapor/air mixture of _____.

    A. 3 percent methane by volume is too rich to burn
    B. 5 percent methane by volume will give a reading of 100 percent L.E.L. on a combustible gas indicator
    C. 10 percent methane by volume is too rich to burn
    D. 20 percent methane by volume is too lean to burn

    Correct answer: B

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    Correct answer: B

45. Which of the following is classified as a grade "E" combustible liquid?

    A. Bunker "C"
    B. Very light naphtha
    C. Benzene
    D. Most commercial gasoline

    Correct answer: A

46. Petroleum vapors are dangerous _____.

    A. only if the oxygen concentration is below 16 percent
    B. at all times due to their toxicity
    C. only if the source of the vapor is above its flash point
    D. only if the vapor is between the upper and lower explosive limit

    Correct answer: B

47. Span gas is used aboard liquefied natural gas carriers to _____.

    A. detect leaks in cargo piping
    B. calibrate the gas leak detectors
    C. inert the barrier spaces
    D. odorize the cargo

    Correct answer: B

48. Tankers carrying cryogenic cargoes, such as LNG, are fitted with gas detector systems alarmed at 30% of the lower explosive limit. If the gas detector alarm sounds, this means _____.

    A. the detector is sampling a space in which 30 percent of the atmosphere is explosive
    B. the detector sensor is sampling a space where the cargo vapor concentration is 30 percent by volume
    C. an explosion is about to take place
    D. a flammable vapor concentration exists at the sample point, but it is too lean to burn

    Correct answer: D

49. The atmosphere of an empty fuel tank is tested and designated "gas free". Which of the following statements is correct concerning this tank?

    A. The concentration of flammable gas in the compartment is less than 10% of the lower flammable limit.
    B. The gas free status is good as long as the initial conditions remain unchanged.
    C. The tank should be frequently retested.
    D. All of the above.

    Correct answer: D

50. A specific document which identifies a chemical, and lists its physical properties, health hazards, required controls, firefighting procedures, cleanup methods, waste disposal, and the safe handling and storage requirements, is commonly called a _____.

    A. Physical/Chemical Characteristics Document
    B. Hazardous Chemical Information Sheet
    C. Hazardous Chemical Loading Document
    D. Safety Data Sheet

    Correct answer: D

51. Which ship must maintain Part II (Cargo/Ballast Operations) of the Oil Record Book?

    A. A ship of 150 gross tons or above, other than an oil tanker
    B. A ship of 200 gross tons or above, other than an oil tanker
    C. An oil tanker of 100 gross tons or above
    D. A non-tanker that carries more than 200 cubic meters of oil in bulk

    Correct answer: D

52. Coast Guard regulations require a shipboard oil pollution emergency plan to be reviewed _____.

    A. once a year
    B. once every two years
    C. once every four years
    D. once every five years

    Correct answer: A

53. Victual waste is _____.

    A. any garbage that comes from food or food provisions
    B. the resultant sludge that is collected after water washing a boiler
    C. the final waste product of a manufacturing process
    D. the final discharge of sewage treatment plants

    Correct answer: A

54. You are providing onboard training to your engineers on the factors affecting trim and stability. What instructions do you give your engineers to stabilize the ship should it experience an unstable rolling behavior?

    A. Add ballast to wing tank to the side of the ship with an angle of list
    B. Discharge dirty ballast from a centerline double bottom tank
    C. Add ballast to a centerline double bottom tank
    D. Discharge water from the forepeak tank

    Correct answer: C

55. Your vessel was damaged in a collision and one compartment has partially flooded. The vessel has free communication with the sea with water flowing in and out as the vessel rolls. Which of the following is the most important factor contributing to free communication loss of stability?

    A. Whether or not the damaged compartment on the opposite side of the vessel is full or empty
    B. Distance from the vessel centerline to the centerline of the damaged compartment
    C. Depth from the bottom of the damaged compartment to the waterline
    D. Breadth of the damaged compartment affected

    Correct answer: B

56. As chief engineer you should understand the concept of loll and its cause. An angle of loll is commonly caused by which of the following conditions?

    A. A negative GM
    B. An off-center weight
    C. Free surface with G remaining below M
    D. High external force such as wind and current

    Correct answer: A

57. After transferring a weight forward on a vessel, the draft at the center of flotation will _____.

    A. change, depending on the location of the LCG
    B. increase
    C. decrease
    D. remain constant

    Correct answer: D

58. With no environmental forces acting on the vessel, the center of gravity of an inclined vessel is vertically aligned with the _____.

    A. center of flotation
    B. metacenter
    C. longitudinal centerline
    D. original vertical centerline

    Correct answer: D

59. As chief engineer your vessel has been damaged and one compartment has partially flooded. You understand that you have lost buoyancy and have added weight. If transverse stability in the flooded condition is poor or negative, every effort should be made to reduce the free surface and to lower the center of gravity. Of main importance is for you to assure which of the following is maintained?

    A. A GM that is at least neutral - G moved down to be at M.
    B. As much reserve buoyancy as possible.
    C. Transfer water from ballast tanks to the opposite side of the damage.
    D. A no list condition.

    Correct answer: B

60. As an engineer, you should be familiar with the conditions that will cause a vessel to transversely incline, list, or trim. Which of the following conditions causes a vessel to trim?

    A. Combination of off-center weight and a negative GM
    B. Fore and aft shift of G
    C. Negative GM
    D. Off-center weight

    Correct answer: B

61. The difference between the starboard and port drafts due to wind or seas is called _____.

    A. trim
    B. heel
    C. flotation
    D. list

    Correct answer: B

62. Reducing the free surfaces within a vessel, reduces the _____.

    A. metacentric height
    B. waterplane area
    C. natural roll period
    D. uncorrected height of the center of gravity

    Correct answer: C

63. Following cargo loading operations, your vessel is experiencing an excessive at-sea hogging bending stress as shown in the illustration. What should you do to reduce the bending moment? Illustration SF-0047

    A. Add ballast to an amidships tank.
    B. Add ballast to the forepeak tank.
    C. Add ballast to the aftpeak tank.
    D. Remove ballast from an amidships tank.

    Correct answer: A

64. Pitching is the rising and falling motion of the bow of a ship oscillating about which axis?

    A. Transverse
    B. Vertical
    C. Longitudinal
    D. Centerline

    Correct answer: A

65. According to the Pollution Prevention Regulations (33 CFR), who is to make the final decision of when oil transfer may begin?

    A. Designated persons in charge of vessel and facility
    B. The senior deck officer present
    C. Any local Coast Guard representative
    D. Captain of the port officer

    Correct answer: A

66. What is the minimum period of time that the air supply for a self-contained breathing apparatus is required to last?

    A. 10 minutes
    B. 15 minutes
    C. 30 minutes
    D. 45 minutes

    Correct answer: C

67. The potable water tanks on your vessel were drained for inspection and cleaning. What would you do before refilling with water?

    A. Disinfect the tank with a chlorine solution.
    B. Disinfect the tank with an ammonia solution.
    C. Nothing needs to be done before refilling the tanks.
    D. Use hull paint to touch up bulkheads in the water tanks.

    Correct answer: A

68. As first engineer, you are standing by the #3 deep fuel oil storage tank as a crew member is working inside the tank. Before entering the tank, the atmosphere was checked and determined safe for men to work. While standing by you notice that the crew member is not moving. After attempts to communicate with the downed mariner receives no response, what action would you take?

    A. Have additional crew members don a SCBA to enter the tank, to aid in the removal of the unconscious crew member.
    B. Call the captain and ask him how you should proceed.
    C. Send another crew member, without a SCBA on, into the tank to retrieve the unconscious crew member.
    D. Send two additional crew members, without a SCBA on, into the tank to retrieve the unconscious crew member.

    Correct answer: A

69. Which of the following statements is true regarding oxygen indicators?

    A. Prolonged exposure to gases such as CO2 may affect the accuracy of the indicator.
    B. The instrument is capable of providing an immediate accurate reading of any space with no delay.
    C. A cotton filter placed in the end of the sampling tube prevents damaging the instrument when exposed to strongly acidic gases.
    D. All of the above.

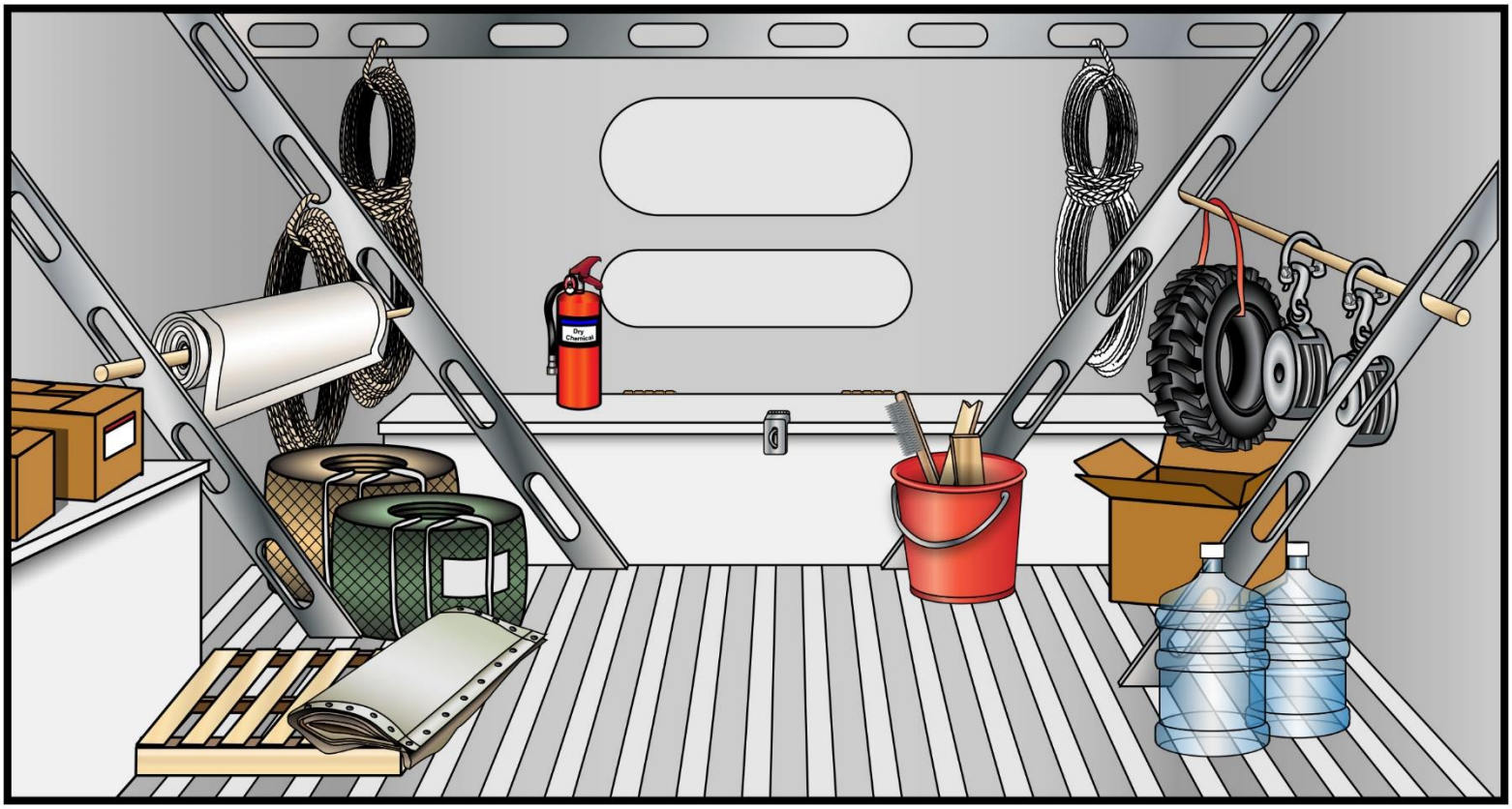
    Correct answer: A

70. When taking samples of a tank atmosphere with an explosimeter, you should _____.

    A. sample only near the ullage openings as all vapors accumulate there
    B. avoid sampling in the vicinity of deep webs to prevent false readings
    C. sample as much of the tank as possible, especially at the bottom
    D. only sample around the deck longitudinals as gases are lighter than air

    Correct answer: C

SF-0001



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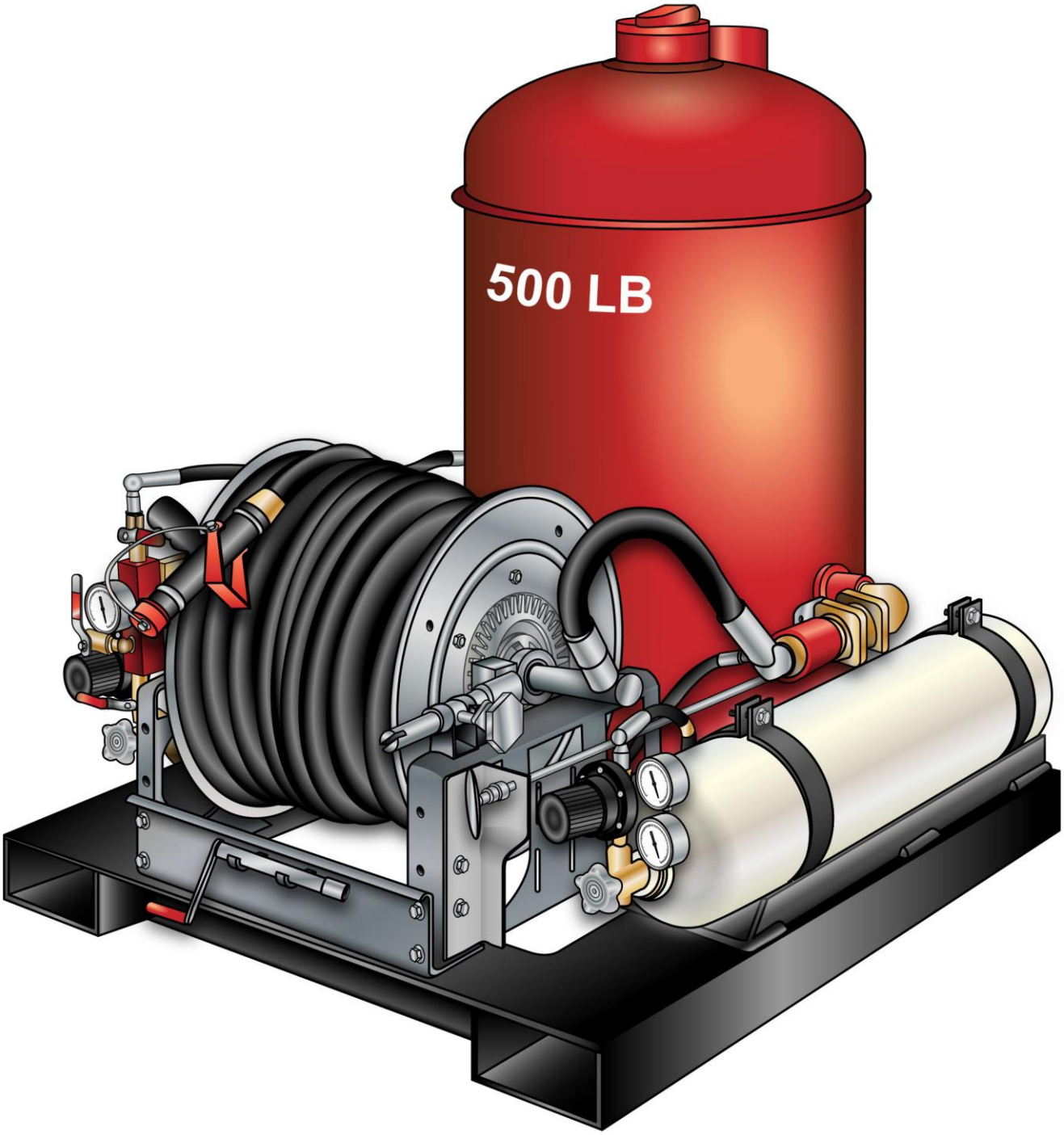

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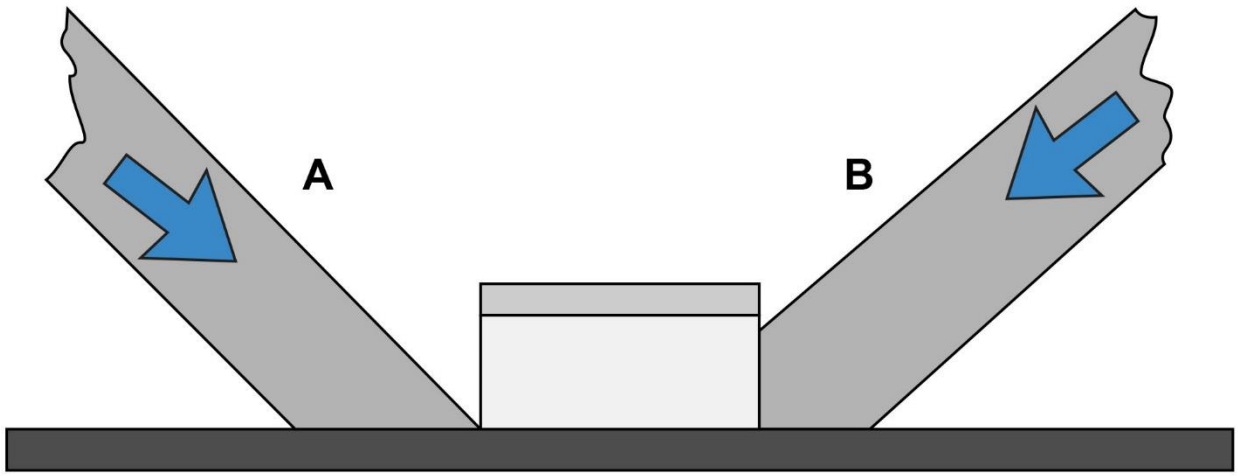

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