

## **ENVIRONMENTAL (DOMAIN I – SHE Management)**

### **ACRONYMS**

<b>AAQS</b>	Ambient air quality standard
<b>AIHC</b>	American Industrial Health Council
<b>ALJ</b>	Administrative Law Judge
<b>BACT</b>	Best Available Control Technology
<b>BLM</b>	Bureau of Land Management
<b>BNA</b>	Bureau of National Affairs
<b>BOD</b>	Biological Oxygen Demand
<b>BTU</b>	British Thermal Unit
<b>CAA</b>	Clean Air Act
<b>CAER</b>	Community Awareness Emergency Response
<b>CAP</b>	Corrective Action Plan
<b>CDC</b>	Center for Disease Control
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act of 1980.(Provides for liability, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous waste disposal sites. Commonly known as Superfund.
<b>CFC's</b>	Chlorofluorocarbons (freons)
<b>CFR</b>	Code of Federal Regulations
<b>CO</b>	Carbon Monoxide
<b>CPSC</b>	Consumer Products Safety Commission
<b>CWA</b>	Clean Water Act
<b>DEQ</b>	Department of Environmental Quality
<b>DOE</b>	Department of Energy
<b>DOH</b>	Department of Health
<b>DOJ</b>	Department of Justice
<b>DOT</b>	Department of Transportation
<b>EAP</b>	Environmental Action Plan
<b>EHS</b>	Extremely Hazardous Substance
<b>EP or TEP</b>	Extraction Procedure or Toxic...
<b>EPA</b>	Environmental Protection Agency
<b>EPCRA</b>	Emergency Planning and Community Right-to-Know Act
<b>ESA</b>	Endangered Species Act
<b>FDA</b>	Food & Drug Administration
<b>FEMA</b>	Federal Emergency Management Agency
<b>FIFRA</b>	Federal Insecticide, Fungicide, and Rodenticide Act
<b>FOIA</b>	Freedom of Information Act
<b>FR</b>	Federal Register
<b>FTC</b>	Federal Trade Commission
<b>FWPCA</b>	Federal Water Pollution Control Act
<b>GAO</b>	General Accounting Office
<b>GC/CD</b>	Gas Chromatograph/Conventional Detector

<b>GC/MS</b>	Gas Chromatograph/Mass Spectrometer
<b>HAP</b>	Hazardous Air Pollutants
<b>HCS</b>	Hazard Communication Standard
<b>HMTA</b>	Hazardous Materials Transportation Act
<b>IAP</b>	Indoor Air Pollutant
<b>LEPC</b>	Local Emergency Planning Commission
<b>MSDS</b>	Material Safety Data Sheet
<b>NAAQS</b>	National Ambient Air Quality Stds- standards of air quality established by EPA for pollutants identified by the Agency as likely to endanger the public health & welfare. Primary standard to protect public health, secondary standard to protect public welfare.
<b>NAS</b>	National Academy of Science
<b>NESHAP</b>	National Emission Standards for Hazardous Air Pollutants – emission limitation established by EPA for pollutants the Agency judges to possess a significant potential for causing health problems, but for which no national air quality stds. have been established
<b>NFPA</b>	National Fire Protection Association
<b>NIH</b>	National Institutes of Health
<b>NIMBY</b>	Not In My Back Yard
<b>NIOSH</b>	National Institute of Occupational Safety & Health
<b>NOAA</b>	National Oceanic & Atmospheric Administration
<b>NOx</b>	Abbreviation for nitrogen oxides or oxides of nitrogen
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>NRC</b>	Nuclear Regulatory Commission
<b>OMB</b>	Office of Management & Budget
<b>OSHA</b>	Occupational Safety & Health Act
<b>PCB's</b>	Polychlorinated Biphenyls
<b>PEL</b>	Permissible Exposure Limit
<b>pH</b>	Value of acidity or alkalinity
<b>ppb</b>	parts per billion
<b>PPE</b>	Personal Protective Equipment
<b>RCRA</b>	Resource Conservation & Recovery Act
<b>RQ</b>	Reportable Quantity
<b>SARA</b>	Superfund Amendments & Reauthorization Act
<b>SIC</b>	Standard Industrial Classification
<b>SQG</b>	Small Quantity Generator
<b>Superfund</b>	Popular term applied to CERCLA and the SARA acts of 1980, 1986 & 1990
<b>TCLP</b>	Toxicity Characteristic Leachate Procedure
<b>Title III (of SARA)</b>	The emergency planning & community right-to-know act of 1986
<b>TLV</b>	Threshold Limit Value
<b>TRI</b>	Toxic Release Inventory
<b>TSCA</b>	Toxic Substances Control Act
<b>TSD</b>	EPA technical support document for water quality based permitting (Sept. 1985)
<b>TSDF</b>	Treatment, Storage & Disposal Facility
<b>TWA</b>	Time Weighted Average
<b>USGS</b>	United States Geological Survey

**VOC**          Volatile Organic Compounds

ENVIRONMENTAL MANAGEMENT QUESTIONS:

1. A condition which results from exposure to welding fumes that is characterized by accumulation of metal oxides in the lung without apparent physical symptoms is called:  
A. pulmonary artesia  
B. siderosis  
C. idiopathic pulmonary distress  
D. byssinosis

**Domain**                    **1**                    **Responsibility**                    **1**  
**Olishifski, Julian B. and McElroy, Frank E. (Eds). "Fundamentals of Industrial Hygiene."**  
**Chicago: National Safety Council, 1971. Page 117.**

2. A delayed type of disease with flu like symptoms is associated with all of the following except:  
A. magnesium oxide fumes  
B. nascent zinc oxide fumes  
C. zinc oxide fumes  
D. thorium oxide fumes

**Domain**                    **1**                    **Responsibility**                    **1**  
**UNKNOWN**

3. "ALARA" is a term most often applied in:  
A. industrial hygiene  
B. safety engineering  
C. health physics  
D. loss control

**Domain**                    **1**                    **Responsibility**                    **1**  
**LAC 33:XV.102 (Definition of Radiological Physicist)**

4. Airborne zinc oxide resulting from welding galvanized iron would be classified as:  
A. dust  
B. smoke  
C. fume  
D. mist

**Domain**                    **1**                    **Responsibility**                    **1**  
**Olishifski, Julian B. and McElroy, Frank E. (Eds). "Fundamentals of Industrial Hygiene."**  
**Chicago: National Safety Council, 1971. Page 120.**

5. All of the following are natural sources of air pollution except:
- A. volcanoes
  - B. soil
  - C. vegetation
  - D. fossil fuels

**Domain**                    **1**                    **Responsibility**                    **1**  
**Nebel, Bernard J. "Environmental Science." The Way the World Works. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981. Page 318.**

6. Arsenic exposure is possible in which of the following occupations?
- A. agricultural pesticide workers
  - B. electronics industry workers
  - C. copper smelting
  - D. all of the above

**Domain**                    **1**                    **Responsibility**                    **1**  
**Agency for Toxic Substances and Disease Registry (ATSDR). 1990. *Toxicological Profile for Arsenic*. U.S. Public Health Service. U.S. Department of Health and Human Services, Atlanta, Georgia.**  
**And/or**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 172.**

7. At ambient pressure, the lowest oxygen concentration permitted by OSHA is:
- A. 15.5%
  - B. 17.5%
  - C. 19.5%
  - D. 25.5%

**Domain**                    **1**                    **Responsibility**                    **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 703.**

8. Barrier creams:
- A. neutralize potential irritants
  - B. reduce contact of the irritants with skin
  - C. are preferred to gloves in most cases
  - D. are not effective

**Domain**                    **1**                    **Responsibility**                    **2**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 75.**

9. Breathing air must meet the requirements for:
- A. grade A breathing air
  - B. grade B breathing air
  - C. grade C breathing air
  - D. grade D breathing air

**Domain**                    **1**                    **Responsibility**                    **1**  
**29 CFR 1910.134(I)(1)(ii)**

10. Carbon dioxide lasers are particularly hazardous because:
- A. they are Q-switched
  - B. they produce a continuous beam
  - C. they are invisible to the human eye
  - D. they are difficult to control

**Domain**                    **1**                    **Responsibility** **1**  
**[http://www.ccohs.ca/oshanswers/phys\\_agents/lasers.html](http://www.ccohs.ca/oshanswers/phys_agents/lasers.html)** (Canadian Centre for Occupational Health and Safety)

11. Catalytic combustion of pollutants implies lower burn temperatures:
- A. true
  - B. false

**Domain**                    **1**                    **Responsibility**                    **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 618.**

12. Diesel engines produce fewer pollutants than do gasoline engines:  
A. true  
B. false

**Domain**                    **1**            **Responsibility**            **1**  
**Wark Kenneth and Warner, Cecil F. "Air Pollution." Its Origin and Control. New York, 1981. Pages 148 - 150.**

13. EPA requires a permit to treat, store, or dispose of hazardous waste. Is a permit required for elementary neutralization units?  
A. yes  
B. no

**Domain**                    **1**            **Responsibility**            **4**  
**40 CFR 270**

14. Elements of a hazardous waste manifest include all of the following except:  
A. liability insurance company  
B. manifest number  
C. EPA identification number  
D. total quantity of waste generated

**Domain**                    **1**            **Responsibility**            **4**  
**40 CFR 263.20(h)(2)**

15. For purposes of hazardous waste generation, a location generating less than 1,000 kg/month is a:  
A. small quantity generator  
B. intermediate quantity generator  
C. large quantity generator  
D. none of the above

**Domain**                    **1**            **Responsibility**            **4**  
**40 CFR 261.5(a)**

16. Gas chromatography is an excellent separation technique for many organic compounds found in the industrial environment. Which of the following is often performed after GC to identify the compound?
- A. IR spectrophotometry
  - B. mass spectrometry
  - C. high performance liquid chromatography
  - D. atomic absorption

**Domain**                    **1**            **Responsibility**            **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 578.**

17. How is asbestos disposed of?
- A. landfill
  - B. incinerated
  - C. chemically dissolved
  - D. none of the above

**Domain**                    **1**            **Responsibility**            **2**  
**COULD NOT FIND.**

18. IDLH means:
- A. Industrial Dept. of Labor & Health
  - B. Immediately dangerous to life & health
  - C. identification, detection & limitations
  - D. nothing pertaining to industrial hygiene

**Domain**                    **1**            **Responsibility**            **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 692.**

19. In order for effective incineration to occur, the process gas does not need to be within its own flammable range:
- A. true
  - B. false

**Domain**                    **1**            **Responsibility**            **2**  
**Wark Kenneth and Warner, Cecil F. "Air Pollution." Its Origin and Control. New York, 1981. Pages 316.**



20. In waste parlance, the term "rubbish" and "garbage" have different meanings. Rubbish is that portion of waste not containing:
- A. cloth
  - B. paper
  - C. recyclables
  - D. food

**Domain**                    **1**            **Responsibility**            **1**  
**LAC 51:XIII.101**

21. Landfilling of hazardous waste flammable liquid is a(n) \_\_\_\_\_ technology for disposal.
- A. acceptable but decreasing option
  - B. acceptable & being used more & more
  - C. unacceptable due to risk of fire
  - D. unacceptable due to risk or cancer

**Domain**                    **1**            **Responsibility**            **2**  
**COULD NOT FIND.**

22. Melanoma is a serious form of skin cancer. The most common occupational cause of melanoma is:
- A. asphalt tar
  - B. UV light from "black lights"
  - C. sunlight
  - D. nitrosamines

**Domain**                    **1**            **Responsibility**            **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 62.**

23. Numbness of the fingers is associated with:
- A. siderosis
  - B. Raynaud's syndrome
  - C. lead poisoning
  - D. carpal tunnel syndrome

**Domain**                    **1**            **Responsibility**            **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 409.**

24. On pressure demand SCBA's there is an alarm to let the wearer know that the air supply has decreased to \_\_\_\_\_ of full.
- A. 10%
  - B. 20 - 25%
  - C. 30%
  - D. 50%

**Domain**                    **1**                    **Responsibility**                    **1**  
**29 CFR 1910.156.f.1.vi**

25. Substitution of a less harmful substance for a toxic material is a practical method of eliminating an industrial health hazard. Substitution should be the primary method of control for which of the following?
- A. Hexane
  - B. Carbon Tetrachloride
  - C. Toluene
  - D. Xylene

**Domain**                    **1**                    **Responsibility**                    **2**  
**Olishifski, Julian B. and McElroy, Frank E. (Eds). "Fundamentals of Industrial Hygiene."**  
**Chicago: National Safety Council, 1971. Pages 440 - 441.**

26. Which of the following is not a property of hazardous waste as defined by RCRA?
- A. Ignitability
  - B. Irritability
  - C. Corrosivity
  - D. Reactivity

**Domain**                    **1**                    **Responsibility**                    **1**  
**40 CFR 261**

27. Of all occupational diseases occurring in industry, the second-most common is:
- A. Lead poisoning
  - B. Silicosis
  - C. Mercury poisoning
  - D. Dermatitis

**Domain**                    **1**                    **Responsibility**                    **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)."**  
**National Safety Council, 2002. Page 409.**

28. Pressure demand units are approved for use in IDLH atmospheres. The approvals are for units that last 15, 30 and 60 minutes. There are also approved units for times of 3, 5 and 10 minutes. These are approved for:
- A. escape only
  - B. escape and emergency (rescue) entry
  - C. entry only
  - D. not for industrial applications

**Domain 1 Responsibility 1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 686-688.**

29. SCBA is:
- A. Service Connected Binding Arbitration
  - B. Society for Certified Breathing Apparatus
  - C. Service Connected Breathing Apparatus
  - D. Self Contained Breathing Apparatus

**Domain 1 Responsibility 2**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 686.**

30. Secondary standards (in regards to drinking water) are related to:
- A. health Data
  - B. esthetics
  - C. none of the above
  - D. both A and B

**Domain 1 Responsibility 1**  
**Worobec, Mary Devin and Hogue, Cheryl. "Toxic Substances Controls Guide" (2<sup>nd</sup> Edition). Washington D.C. 1992. Glossary Page 261.**

31. SCBA must be inspected:
- A. annually
  - B. semiannually
  - C. monthly
  - D. weekly

**Domain 1 Responsibility 1**  
**Olishifski, Julian B. and McElroy, Frank E. (Eds). "Fundamentals of Industrial Hygiene." Chicago: National Safety Council, 1971. Page 671.**

32. Supplied air respirators can be used in IDLH atmospheres only if they:
- A. are equipped with auxiliary escape air
  - B. supply line <300 ft. in length
  - C. maximum inlet pressure <125 psig
  - D. all of the above

**Domain**                    **1**                    **Responsibility**                    **1**  
**29 CFR 1910.134(d)(2)**

33. The conversion of ammonical nitrogen to nitrate ion through the aeration of activated sludge is called:
- A. nitrogen fixation
  - B. nitrification
  - C. nitrate reduction
  - D. denitrification

**Domain**                    **1**                    **Responsibility**                    **1**  
**Nebel, Bernard J. "Environmental Science." The Way the World Works. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981. Page 123.**

34. The greenhouse effect is due to disruption of which of the following geochemical cycles?
- A. nitrogen
  - B. sulfur
  - C. carbon
  - D. oxygen

**Domain**                    **1**                    **Responsibility**                    **1**  
**Wark Kenneth and Warner, Cecil F. "Air Pollution." Its Origin and Control. New York, 1981. Pages 66 - 69.**

35. The key element in RCRA designed to track hazardous waste from "cradle to grave" is:
- A. statute of limitations
  - B. criminal liability
  - C. manifest
  - D. EPA attorney

**Domain**                    **1**                    **Responsibility**                    **2**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 822.**

36. The phenomenon of biomagnification of heavy metals is due to:
- A. second law of thermodynamics
  - B. lead pipes
  - C. collapsed sewer mains
  - D. food chain

**Domain**                    **1**                    **Responsibility**                    **1**  
**Nebel, Bernard J. "Environmental Science." The Way the World Works. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981. Page 342-346.**

37. The preferred method of sampling for benzene is :
- A. fritted bubbler with NaOH
  - B. activated charcoal tube
  - C. portable LIRA
  - D. midget impinger with H<sub>2</sub>O<sub>2</sub>

**Domain**                    **1**                    **Responsibility**                    **1**  
**COULD NOT FIND.**

38. The gas "radon" gives rise to particulate decay products.
- A. true
  - B. false

**Domain**                    **1**                    **Responsibility**                    **1**  
**<http://www.llnl.gov/str/Robison.html> (Lawrence Livermore National Laboratory)**

39. The removal of insoluble matter from water is referred to as:
- A. primary waste treatment
  - B. secondary waste treatment
  - C. tertiary waste treatment
  - D. activated sludge process

**Domain**                    **1**                    **Responsibility**                    **2**  
**Nebel, Bernard J. "Environmental Science." The Way the World Works. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981. Page 262-263.**

40. Viable reasons for incineration of air pollutants include:
- A. odor control
  - B. reduce VOC emissions
  - C. reduce explosion hazard
  - D. all of the above

**Domain**                    **1**                    **Responsibility**                    **1**  
**Wark Kenneth and Warner, Cecil F. "Air Pollution." Its Origin and Control. New York, 1981. Pages 314 – 315.**

41. The term ALARA stands for:
- A. as low as reasonable achievable
  - B. as low as regulations allow
  - C. as low as requirements admit
  - D. none of the above

**Domain**                    **1**                    **Responsibility**                    **1**  
**LAC 33:XV.102**

42. What does BOD stand for?
- A. Biological oxygen demand
  - B. basic oxygen demand
  - C. biochemical oxygen determination
  - D. your favorite actress (actor)

**Domain**                    **1**                    **Responsibility**                    **1**  
**Nebel, Bernard J. "Environmental Science." The Way the World Works. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981. Page 259.**

43. What is a lab pack?
- A. a special kind of waste drum
  - B. assortment of small amounts of compatible chemicals
  - C. a type of manifest
  - D. none of the above

**Domain**                    **1**                    **Responsibility**                    **2**  
**29 CFR 1910.120.J.6 or <http://www.epa.gov/sbo/labguide.htm> (Fact Sheet prepared to provide information about a new document on small chemical laboratory environmental issues)**

44. What is the concentration of a chemical that will kill each and every test animal?  
A. LD50  
B. LD100  
C. LED100  
D. LET100

**Domain**                      **1**                      **Responsibility**                      **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 127.**

45. What is the first thing to do when a water sample comes into a lab?  
A. smell it  
B. take pH  
C. log it in  
D. analyze it

**Domain**                      **1**                      **Responsibility**                      **1**  
**Chain-of –Custody Guidance Document**  
[http://www.scdhec.com/envserv/labcert/chain\\_of\\_custody.pdf](http://www.scdhec.com/envserv/labcert/chain_of_custody.pdf)

46. What is the main reason for fish kills in streams by pollution?  
A. depletion of oxygen  
B. lack of food supply  
C. toxic effects of pollutant  
D. increased temperature of water

**Domain**                      **1**                      **Responsibility**                      **1**  
**Nebel, Bernard J. "Environmental Science." The Way the World Works. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981. Page 280.**

47. Which of the following is the most economical method of treating acidic industrial waste with a pH of 3 or below?  
A. dilution to raise pH  
B. stabilization pond with aeration  
C. neutralization  
D. oxygenation alone

**Domain**                      **1**                      **Responsibility**                      **2**  
**COULD NOT FIND.**

48. Which protective device would you choose for workers required to enter a large solvent tank for cleaning?
- A. dust mask
  - B. airline respirator
  - C. supplied air with an escape bottle
  - D. chemical cartridge respirator

**Domain**                      **1**                      **Responsibility**                      **2**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 688-692.**

49. The most common danger from chromium electroplating is:
- A. mists of chromic acid
  - B. splashes of acid
  - C. high voltage
  - D. extremely slippery floors

**Domain**                      **1**                      **Responsibility**                      **1**  
**Olishifski, Julian B. and McElroy, Frank E. (Eds). "Fundamentals of Industrial Hygiene." Chicago: National Safety Council, 1971. Page 765.**

50. Which of the following would you associate with the logging industry?
- A. brucellosis
  - B. raynaud's
  - C. anthrax
  - D. silicosis

**Domain**                      **1**                      **Responsibility**                      **1**  
**Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5<sup>th</sup> Edition)." National Safety Council, 2002. Page 413.**



## ENVIRONMENTAL MANAGEMENT ANSWERS:

1. "B" Siderosis is a pigmentation of the lung due to iron oxide exposure. The pigmentation can be marked but there seems to be no physical detriment. Some siderosis patients, however, have chronic bronchitis and dyspnea. Differential diagnosis is difficult.
2. "D" Metal fume fever is caused by exposure to freshly generated (nascent) fumes of zinc, magnesium, and other oxides. Although zinc and magnesium are the most common causes, copper has also been known to cause metal fume fever.
3. "C" "As Low As Reasonably Achievable" is applied frequently in the health physics (radiation) field.
4. "C" Fumes are produced from materials which are solids at room temperature, but have been vaporized, and then condensed as microscopic droplets. Fumes are often oxides of metals. Zinc oxide would therefore be classified as a fume.
5. "D" Fossil fuels are a component of the global carbon cycle. Since man produces, refines, and combusts fossil fuels, they are a manmade pollutant.
6. "D" Some arsenates are used in pesticides; various arsenic compounds are used as doping agents in semiconductor manufacturing; arsenic trioxide is produced in large quantities in the smelting of copper. Therefore, "all of the above" is the correct answer for this question.
7. "C" The normal concentration of oxygen in air is 21%. OSHA allows a minimum of 19.5% for surface work. Symptoms of hypoxia (insufficient oxygen in breathing air) typically begin at 16%.
8. "B" Barrier creams, as their name implies, form a protective coating between the skin and the chemical. They are not neutralizing agents for chemicals.
9. "D" In 29 CFR 1910.134, OSHA requires at least grade D breathing air.
10. "C" CO<sub>2</sub> lasers are invisible to the naked eye. This makes them particularly hazardous.
11. "A" Catalytic technology was introduced to lower the temperature required to oxidize pollutants. The catalytic converter in your car oxidizes unburned hydrocarbons from the engine's cylinders prior to releasing the exhaust gas to the atmosphere. The catalyst allows this oxidation to occur at temperatures well below those of the engine's cylinders (where actual flame occurs).

12. "B" Diesel engines release more fine particulates than gasoline engines and diesel fuel has significantly more sulfur in it than refined gasoline. These two pollutants (particulates and oxides of sulfur) make diesel engines (despite their higher fuel efficiency) more polluting than gasoline engines of equivalent horsepower.
13. "B" Under 40 CFR 270, elementary neutralization units are specifically excluded from permit requirements. Neutralization units are those that adjust acidity and alkalinity (pH) of waste streams.
14. "A" A hazardous waste manifest does not require an insurance company number. It does, however, require all three other items.
15. "A" Per 40 CFR 261, "small quantity generators" make less than 1,000 kg/month of waste materials.
16. "B" Gas Chromatography / Mass Spectrometry (GC-MS) is commonly performed to separate and identify an item of interest from a mixture of materials. First, GC separates a mixture based on differences in boiling point and solubility. Differences in these properties produce differences in retention times in the GC column, separating the mixture. Second, MS fractures and ionizes each compound into a recognizable spectrographic pattern. The combination is extremely accurate in identifying even trace amounts of a chemical.
17. "A" Asbestos waste is commonly land-filled. Being a mineral, asbestos neither burns nor dissolves readily.
18. "B" The term IDLH stands for "Immediately Dangerous to Life and Health. NIOSH defines the IDLH condition as "an atmosphere in which staying longer than 30 minutes will cause irreversible effects or hinders the workers ability to exit." IDLH conditions can be caused by low oxygen content, chemical contamination, or other air impurities.
19. "B" To achieve effective incineration, gas must be within its own flammable range. Too rich or too lean conditions cause incineration efficiency to drop. This does not mean that it is impossible to achieve effective incineration of a gas that is out of its flammable range (particularly if a catalyst is used). It does mean, however, that the incineration is not efficient.
20. "D" The term "garbage" specifically refers to waste containing food or used food containers/utensils, etc. The term "rubbish" refers to non hazardous waste without food residues.
21. "A" Land-filling is increasingly being outlawed as a disposal method for flammable hazardous waste liquids. The EPA and some states have now banned this practice. Groundwater contamination is the primary concern behind these bans.

22. "C"            Melanoma is skin cancer. Excess exposure to sunlight is the most common cause of melanoma. Because of their light skin, Caucasian workers are particularly susceptible to melanoma.
23. "B"            Raynaud's syndrome is a disease associated with the use of hand-held vibrating tools. It results in loss of feeling, numbness, and tingling in the fingers and hands. Raynaud's is characterized by white spots on the fingers and hands of the affected worker.
24. "B"            All pressure-demand Self-Contained Breathing Apparatus (SCBA) units are required by NIOSH-MSHA to have a low-air alarm. The alarm must alert the user (by audible *and* tactile means – usually a vibrator) when the SCBA's air supply falls to between 20% and 25% of full. This alarm gives the SCBA user adequate time to safely exit a hazardous atmosphere before running out of supplied breathing air.
25. "B"            Carbon tetrachloride is the most toxic of the substances listed; therefore, it should be the prime target of any substitution effort.
26. "B"            "Irritability" is not a listed characteristic of hazardous waste per the EPA.
27. "D"            Dermatitis accounts for approximately 40% of occupational disease reports to OSHA.
28. "A"            Short-duration pressure demand units having use times of three, five, or 10 minutes are unsuitable for anything but escape purposes. These small SCBA units are not approved for *entry* into IDLH atmospheres, but may be used to *escape* if the main airline or SCBA fails.
29. "D"            The term "SCBA" is commonly used to represent "Self-Contained Breathing Apparatus." This term is different from "SCUBA" which stands for "Self-Contained Underwater Breathing Apparatus," which was invented by Jaques Cousteau.
30. "B"            Primary potable water standards concern health issues. Secondary potable water standards have to do with color, taste, and smell.
31. "C"            OSHA 29 CFR 1910.134(h)(3)(i)(B) specifies monthly inspections for SCBA and any other respirator intended for emergency use.
32. "D"            All of the listings are required by NIOSH/MSHA. Additionally, airflow into the face piece must be  $\geq 4$  cfm.
33. "B"            In the sewage treatment process, wastewater is aerated for nitrification.
34. "C"            The disruption of the carbon cycle (due primarily to fossil fuel combustion) causes the "greenhouse effect." On a global scale, this phenomenon is called "global warming."

35. “C”           The hazardous materials manifest system is used to track waste from originator to final resting place. This tracking system is called “cradle to grave.”
36. “D”        The food chain serves to concentrate heavy metals in the uppermost predators. Lower forms in the food chain ingest heavy metals, storing these contaminants in their flesh. Higher predators eat the lower forms, thus concentrating heavy metals in the predators. Man, being the highest order predator is now being advised to avoid the flesh of large, predatory oceanic fish in order to avoid heavy metal (primarily mercury) contamination.
37. “B”           Activated charcoal is recommended by NIOSH for sampling hydrocarbons in air. The charcoal is an excellent capture medium for hydrocarbons because charcoal is non-polar and because charcoal has a very large amount of surface area per its volume. The charcoal captures hydrocarbon molecules through a process called “adsorption.” This means that the molecules stick (or “adhere”) to the surface of the capture medium (in this case, charcoal). The adhered hydrocarbon molecules can then be removed from the charcoal surface in the laboratory with solvent (typically carbon disulfide). Finally GC or GC-MS analysis can sort the hydrocarbons from the solvent and quantify the results.
38. “A”        As radon decays, it forms particulates which can be collected using a filter and a high-volume (high air flow rate) sampler pump. These particles can be measured in a laboratory, and the original radon quantity can be calculated.
39. “A”        Screening, removal of grit, and primary sedimentation are collectively called “primary waste water treatment.”
40. “D”        Controlled incineration accomplishes all of the stated goals.
41. “A”        “As Low As Reasonably Achievable” is the goal of radiation control. The term is used frequently in the health physics field.
42. “A”        “Biological Oxygen Demand” is the quantity of oxygen used in the aerobic stabilization of waste water. BOD is also a naturally occurring phenomenon. High BOD sometimes creates a coastal phenomenon involving anaerobic bacteria called “red tide.” Causes of excess BOD include fertilizer runoff into waterways and natural degeneration of plant material under water.
43. “B”           A “lab pack” is, by definition, a collection of small amounts of compatible chemicals.
44. “B”           The term “LD 100” means “lethal dose - 100%.” This is the concentration of a chemical in air that will be fatal to all the test animals in a laboratory setting.
45. “C”           Good laboratory procedure dictates that any incoming sample be immediately logged (recorded in the permanent records) as soon as possible after arrival.

46. “A” BOD depletes the available oxygen in water. Although other factors do cause grave ecological damage, lack of oxygen is the primary cause of most fish kills.
47. “C” Since pH is a logarithmic scale, a pH of three or below is *very* acidic. Dilution and oxidation are unlikely to raise the pH of such a strong acid either quickly or efficiently. Therefore, neutralization (in this case, addition of a caustic substance to increase the overall pH) is the quickest and most cost effective way to reach neutrality (pH of seven).
48. “C” Since an IDLH atmosphere may exist in a solvent tank, the full protection of a supplied air respirator with a portable escape air supply is required. Solvents and solvent residues may be toxic and/or flammable. Although entry could be made with a SCBA, an emergency escape bottle is always required in atmospheres that are unknown or that may be IDLH.
49. “A” Inhalation of chromic acid mists is the most common hazard in electroplating.
50. “B” A combination of cold and vibration (often found using chain saws in northerly climates) can cause Raynaud’s syndrome. Brucellosis is an infection caused by drinking unpasteurized milk. Anthrax is a bacterial infection from animals. Silicosis is a pneumoconiosis of quartz miners.