

CHAPTER 18--AIR POLLUTION

Student: _____

1. The *Asian Brown Cloud* is approximately the size of
 - A. Tibet
 - B. Shanghai
 - C. India
 - D. China and India
 - E. Continental U.S.
2. Which of the following is not a part of the *Asian Brown Cloud*?
 - A. ozone
 - B. toxic metals
 - C. dust
 - D. smoke and ash
 - E. mercury
3. Approximately how much of the toxic mercury in the skies above Los Angeles, California can be traced to the *Asian Brown Cloud*?
 - A. 0%
 - B. 1%
 - C. 12%
 - D. 33%
 - E. 67%
4. The correct sequence of layers of the atmosphere from innermost to outermost is
 - A. mesosphere-stratosphere-thermosphere-troposphere
 - B. troposphere-stratosphere-mesosphere-thermosphere
 - C. stratosphere-thermosphere-troposphere-mesosphere
 - D. thermosphere-stratosphere-mesosphere-troposphere
 - E. thermosphere-mesosphere-stratosphere-troposphere
5. The atmosphere is divided into spherical layers based upon the
 - A. density of each layer
 - B. concentration of ozone in each layer
 - C. temperature changes from variations in absorption of solar energy
 - D. concentration of oxygen in each layer
 - E. precipitation in each layer

6. The atmospheric layer containing 75% of the mass of earth's air is the
- A. thermosphere
 - B. mesosphere
 - C. stratosphere
 - D. troposphere
 - E. tropopause
7. Approximately how much of the air we breathe is composed of nitrogen and oxygen?
- A. 99%
 - B. 77%
 - C. 63%
 - D. 54%
 - E. 33%
8. If the earth were an apple, the lower layer of the atmosphere would be the thickness of
- A. the core
 - B. the part of the apple we eat
 - C. the skin
 - D. the whole apple
 - E. a seed
9. Most of earth's climate occurs in the
- A. troposphere
 - B. thermosphere
 - C. mesosphere
 - D. stratosphere
 - E. tropopause
10. Most of the ozone layer is found in which of the following?
- A. thermosphere
 - B. mesosphere
 - C. thermopause
 - D. stratosphere
 - E. troposphere
11. The stratosphere differs from the troposphere because it contains
- A. 1/1000th the oxygen
 - B. 1/1000th the nitrogen
 - C. 1/1000th the water vapor
 - D. 1/1000th the ozone
 - E. 1,000 times the carbon dioxide

12. Which of the following is *not* one of the results of the UV filtering effect of the ozone layer?
- A. allows humans and other forms of life to exist on land
 - B. protects humans from sunburn
 - C. protects our immune system from damage
 - D. prevents the formation of photochemical ozone near the ground
 - E. reduces the amount of water vapor in the troposphere
13. Harmful chemicals emitted directly into the air from natural processes and human activities are called
- A. secondary pollutants
 - B. smog
 - C. photochemical smog
 - D. tertiary pollutants
 - E. primary pollutants
14. Human inputs of outdoor air pollutants occur mostly
- A. in rural areas
 - B. in the mountains
 - C. along the oceans
 - D. in urban areas
 - E. in the deserts
15. The biggest air pollution threat to poor people is
- A. badly maintained automobiles
 - B. pollutants from industry
 - C. indoor air pollution
 - D. smoke from burning forests
 - E. dust blown into the air
16. According to the World Health Organization, one in every ____ persons lives in urban areas with air that is unhealthy to breathe.
- A. two
 - B. six
 - C. ten
 - D. twenty
 - E. fifty
17. Which of the following is *not* one of the major air pollutants?
- A. suspended particulate matter
 - B. sulfur dioxide
 - C. nitrogen oxides
 - D. formaldehyde
 - E. ozone

18. All of the following are volatile organic compounds (VOCs), *except*
- A. methane
 - B. industrial solvents
 - C. carbon monoxide
 - D. benzene
 - E. components of gasoline
19. What do all volatile organic compounds have in common?
- A. All are carbon based.
 - B. All are produced from manmade sources.
 - C. All are emitted for processing and/or burning fossil fuels.
 - D. All are colorless, odorless reactive gases.
 - E. All are naturally occurring colorless and odorless gases found in rocks and vegetation.
20. Which of the following is *not* a way to prevent lead poisoning?
- A. phase out waste incineration
 - B. ban the use of lead pencils in schools
 - C. ban lead glazing on ceramic ware used to serve food
 - D. ban the use of lead solder
 - E. ban candles with lead cores
21. How many children in less-developed countries have permanent brain damage because of lead poisoning?
- A. 15million to 18 million
 - B. 8 million to 12 million
 - C. 5 million to 7 million
 - D. 2 million to 3 million
 - E. approximately 1 million
22. Sixteen of the world's twenty most polluted cities are found in
- A. the United States
 - B. Brazil
 - C. the Ukraine
 - D. China
 - E. Mexico
23. Photochemical smog is formed when primary pollutants interact with
- A. sunlight
 - B. water vapor
 - C. sulfur dioxide
 - D. oxygen
 - E. carbon

24. Photochemical smog is characteristic of urban areas with many vehicles and a climate that is
- A. cool, wet, and cloudy
 - B. cool, dry, and sunny
 - C. warm, dry, and sunny
 - D. warm, wet, and cloudy
 - E. warm, wet, and sunny
25. Primary pollutants from burning coal include all of the following, *except*
- A. carbon monoxide
 - B. sulfur dioxide
 - C. soot
 - D. ozone
 - E. carbon dioxide
26. Gray-air smog comes from suspended particles of
- A. carbon dioxide
 - B. ammonium salts
 - C. soot
 - D. carbonic acid
 - E. ozone
27. Which of the following would *not* be a factor that reduces outdoor air pollution?
- A. Particles that are heavier than air settle out of the atmosphere.
 - B. Rain and snow wash pollutants out of the atmosphere.
 - C. Winds sweep pollutants away.
 - D. Chemical reactions form acid precipitation which falls out of the atmosphere
 - E. Radiation from the sun converts pollutants into benign chemicals.
28. Which of the following is *not* one of the factors that increase outdoor air pollution?
- A. buildings slow wind speed and reduce dilution of pollutants
 - B. hills and mountains reduce the flow of air in valleys
 - C. high temperatures promote formation of photochemical smog
 - D. movement of air over the oceans encounter salty sea spray
 - E. temperature inversions form over cities surrounded by mountains
29. Which of the following statements is *true*?
- A. Temperature inversion occurs when a layer of cold air prevents warm air from rising.
 - B. Temperature inversions make pollution problems worse.
 - C. Temperature inversions last only a few minutes to a few hours.
 - D. Normally, cool air near earth's surface expands and rises, carrying pollutants higher into the troposphere.
 - E. Temperature inversions help prevent air pollution

30. A temperature inversion is the result of
- A. precipitation
 - B. cold air drainage
 - C. a lid of warm air on top of cooler, stagnant air
 - D. a cold blanket of air that prevents warm air from rising
 - E. mixing of cool and warm air
31. Typical precipitation in the eastern United States is how many times more acidic than natural precipitation would be?
- A. 2 times
 - B. 4 times
 - C. 6 times
 - D. 8 times
 - E. 10 times
32. Acid deposition is best classified as a(n)
- A. local problem
 - B. state problem
 - C. regional problem
 - D. national problem
 - E. international problem
33. Which of the following is not true of acid deposition?
- A. 45 U.S. states have issued warnings to not eat fish
 - B. low pH increases plant nutrients in forest soils
 - C. several thousand lakes in Norway and Sweden contain few fish
 - D. crops are harmed by low pH
 - E. mountaintop forests are hardest hit regions
34. Acidic rain, snow, fog, and cloud vapor typically has a pH of
- A. 3.6
 - B. 4.6
 - C. 5.6
 - D. 6.6
 - E. 7.6
35. How much additional reduction of SO_2 emissions from coal burning power plants in Midwestern states will be necessary before lakes in the northeastern U.S. can recover?
- A. 20%
 - B. 40%
 - C. 60%
 - D. 80%
 - E. 100%

36. Which of the following would not be an effective preventive measure for acid deposition?
- A. reduce coal use
 - B. burn low-sulfur coal
 - C. switch to natural gas or renewable energy resources
 - D. adding lime to neutralize the acids
 - E. remove SO_2 and NO_x from motor vehicle exhausts
37. The WHO and the World Bank call indoor air pollution
- A. world's most serious air pollution problem
 - B. an important air pollution problem
 - C. not a serious air pollution problem
 - D. a serious problem only for poor people
 - E. a serious problem only for developed nations
38. Which of the following is *not true* of indoor air pollution in the United States?
- A. levels of 11 pollutants are 2 to 5 times higher in inside US homes than outside
 - B. pollution levels inside cars in urban areas are up to 18 times higher than outside
 - C. health risks are magnified because 70-98% of time is spent in cars or homes
 - D. outdoor air pollution has a high cancer risk than indoor air pollution
 - E. pesticides and lead accumulate in carpet and on furniture in homes
39. *Sick Building Syndrome* is linked to all of the following, *except*
- A. headaches
 - B. coughing and sneezing
 - C. lung cancer
 - D. chronic fatigue
 - E. depression
40. All of the following are on EPA's "four most dangerous indoor air pollutants list," *except*
- A. ultrafine particles of various substances
 - B. radon-222
 - C. sulfur dioxide
 - D. tobacco smoke
 - E. formaldehyde
41. The chemical that causes most people in developed countries the most difficulty is
- A. chloroform
 - B. formaldehyde
 - C. carbon monoxide
 - D. asbestos
 - E. sulfur dioxide

42. Exposure to indoor formaldehyde pollution is *least* likely to cause
- A. ulcers
 - B. headaches
 - C. chronic breathing problems
 - D. dizziness
 - E. sore throat
43. Respiratory illnesses in developing countries are most likely to be caused by
- A. formaldehyde
 - B. cigarette smoke
 - C. particulate matter
 - D. asbestos
 - E. chloroform
44. Radioactive _____ is a product of uranium decay
- A. radon
 - B. radium
 - C. plutonium
 - D. lead
 - E. hydrogen
45. About 90% of radon related lung cancers in the US occur among
- A. overweight people
 - B. immune suppressed people
 - C. pregnant women
 - D. current or former smokers
 - E. the elderly
46. According to the EPA, adding radon control could add how much to the cost of a new home?
- A. \$10,000
 - B. \$5,000
 - C. \$2,000
 - D. \$1000
 - E. \$500
47. How many people in the United States die each year from air pollution related reasons?
- A. 25,000 to 30,000
 - B. 50,000 to 66,000
 - C. 75,000 to 110,000
 - D. 100,000 to 175,000
 - E. 125,000 to 350,000

48. In the United States, how many people get cancer from breathing diesel fumes from buses and trucks?
- A. 10,000
 - B. 50,000
 - C. 75,000
 - D. 100,000
 - E. 125,000
49. Large diesel trucks emit as much particulate matter as how many cars?
- A. 20
 - B. 50
 - C. 75
 - D. 150
 - E. 1500
50. During the 1980 and 2008 period, decreases in emissions occurred for all of the following pollutants, *except*
- A. lead
 - B. CO₂
 - C. SO₂
 - D. CO
 - E. ground-level ozone
51. According to a 2009 EPA report, between 1980 and 2008, the combined emissions of six major air pollutants decreased by how much?
- A. 17%
 - B. 23%
 - C. 36%
 - D. 49%
 - E. 54%
52. According to environmental scientists, all of the following would strengthen U.S. air pollution control laws, *except*
- A. greater emphasis on prevent air pollution
 - B. sharply reduce emissions from older coal-burning power plants
 - C. relax controls on petroleum refineries
 - D. improve fuel efficiency standards on motor vehicles
 - E. stricter air pollution regulations on airports and ocean going ships

53. Between 1990 and 2006 emissions trading systems reduced SO₂ emissions by power plants in the U.S. by 53% at what cost to the industry?
- A. 100 times what the EPA projected
 - B. one-tenth what was expected by the industry
 - C. approximately what the industry projected
 - D. 3 times what the EPA expected
 - E. no cost to the industry
54. Air pollution in the urban areas of many less-developed countries is
- A. getting much better
 - B. remaining about the same
 - C. getting a little better
 - D. getting worse
 - E. at crisis levels
55. Air pollution is understood as primarily a localized urban problem.
- True False
56. As much as 33% of the toxic mercury in the skies over Los Angeles comes from coal-fired plants and other sources in China.
- True False
57. Pollution such as the *Asian Brown Cloud* can be cleared up fairly quickly when standards are set for coal-burning industries.
- True False
58. Carbon dioxide makes up 21% of the air we breathe.
- True False
59. The troposphere is about 17 kilometers thick at both the equator and at the north and south polar regions.
- True False
60. The troposphere contains approximately 75-80% of the earth's air mass.
- True False
61. The temperature of the earth's atmosphere increases in the stratosphere because the ozone in the stratosphere absorbs UV radiation from the sun.
- True False

62. The rising and falling air currents in the troposphere are largely responsible for the earth's short-term weather and long-term climate.
- True False
63. Scientists think the South Asian Brown Clouds may be a factor in the melting of the Himalayan glaciers.
- True False
64. Because of the earth's shape, the atmosphere is thicker over the North and South Pole than at the equator.
- True False
65. The ozone layer surrounding the earth is formed when molecules of oxygen in that layer are converted to ozone by UV radiation.
- True False
66. Air pollutants only come from human-made sources.
- True False
67. Air pollution is a recent phenomenon, which started when coal-burning became common in the Industrial Revolution.
- True False
68. Chemicals in the atmosphere combine with one another and with natural components of air to form new, harmful chemicals, called primary pollutants.
- True False
69. Over the past 30 years, the quality of outdoor air in most developed countries has greatly improved.
- True False
70. The biggest pollution threat to poor people is indoor air pollution caused by burning of wood, charcoal, coal, or dung in open fires in their houses.
- True False
71. Secondary pollutants can be classified by the source of pollution, such as stationary sources or mobile sources.
- True False

72. Ninety three percent of the carbon dioxide in the atmosphere is the result of the natural carbon cycle.
- True False
73. There is considerable scientific evidence that human activities have resulted in increasing levels of CO₂ and the warming of the earth's climate.
- True False
74. Methane is twenty times more effective at warming the atmosphere than is carbon dioxide.
- True False
75. Between 1976 and 2006, the percentage of U.S. children, ages 1-5 years with blood lead levels above the safety standard increased by 85%.
- True False
76. The United States leads the world in the use of technology to detect air pollutants.
- True False
77. Urban industrial smog is rarely a problem in most developed countries.
- True False
78. Photochemical smog is a mixture of primary and secondary pollutants formed under the influence of UV radiation from the sun.
- True False
79. The grasshopper effect occurs when air pollutants are transported from tropical and temperate areas to the earth's polar regions by evaporation and wind.
- True False
80. Dry acid deposition occurs near the emission source, while wet deposition occurs in more distant areas.
- True False
81. Most of the world's forests and lakes are being destroyed or seriously harmed by acid deposition.
- True False
82. Twelve hundred lakes in Ontario, Canada contain few, if any, fish as a result of acid deposition.
- True False

83. Indoor air pollution usually poses a much greater threat to human health than outdoor air pollution, even in the developed world.

True False

84. The four most dangerous indoor air pollutants in developed countries are tobacco smoke, formaldehyde, radioactive radon, and very small particles.

True False

85. More than half of all commercial buildings in the United States exhibit the “sick building syndrome.”

True False

86. The chance of getting lung cancer from radon gas is much higher if you are a smoker or a former smoker.

True False

87. A large diesel truck emits as much particulate matter as 150 cars, and diesel trains emit as much as 1500 cars.

True False

88. Between 1990 and 2006 the cap and trade system of emissions control resulted in a reduction of SO₂ emissions from electric power plants by 53%, but at a cost twice what was expected by the industry.²

True False

89. Long-lived air pollutants from China, India, and the United States, can circle the entire globe in about _____.

90. One-third of the mercury in the skies above _____ can be traced to the air pollution made in China.

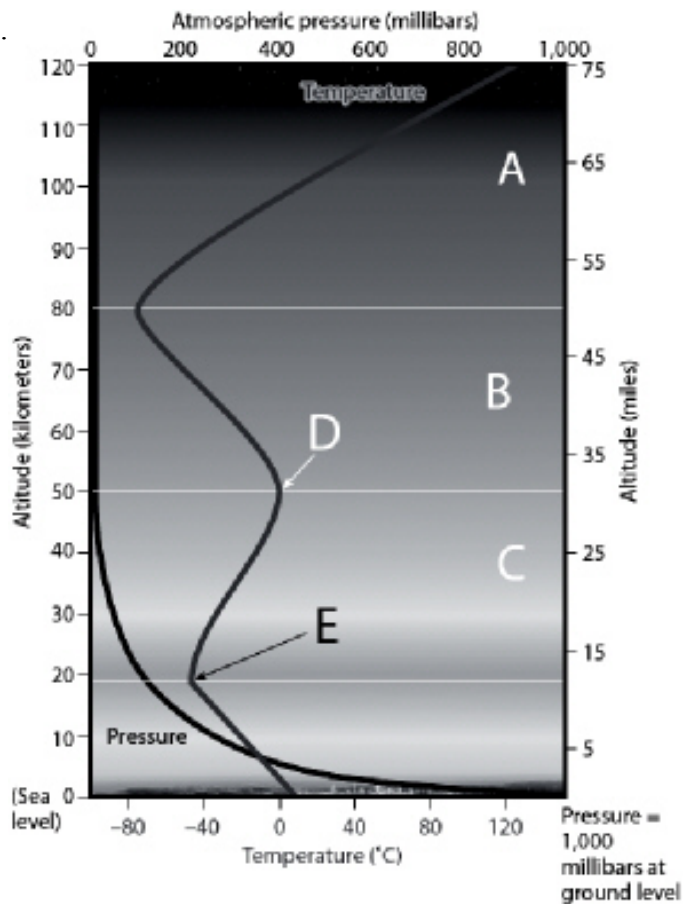
91. Seventy-five to eighty percent of the earth's air mass is found in the _____.

92. Sunlight, the production of oxides of nitrogen, and the production of volatile organic compounds must be present to develop _____.

93. Organic compounds that exist as gases in the atmosphere or that evaporate from sources on earth into the atmosphere are called _____.
- _____
94. A(n) _____ may occur during the movement of a cold front, or result from the infiltration of ocean air by a cooler onshore breeze.
- _____
95. London is world famous for its episodes of _____.
- _____
96. _____ can result from the decomposition of organic wastes in municipal solid waste landfills as well as the raising of livestock.
- _____
97. Natural causes of _____ include volcano emissions, lightning, and microbial processes.
- _____
98. A(n) _____ neutralizes a basic or acidic substance.
- _____
99. _____ is a colorless gas used in foam insulation and can cause irritation of eyes, throat, skin, and lungs.
- _____
100. A French study found that _____ attacks increased by about 30% on smoggy days.
- _____
101. Recent EPA studies suggest that each year more than _____ Americans get cancer from breathing soot-laden diesel fumes.
- _____
102. The _____ may not be an efficient method of reducing emissions because it creates incentive to cheat and would have to be carefully monitored.
- _____

103. The _____ established air pollution regulations for pollutants to be enforced by states and cities.

104.

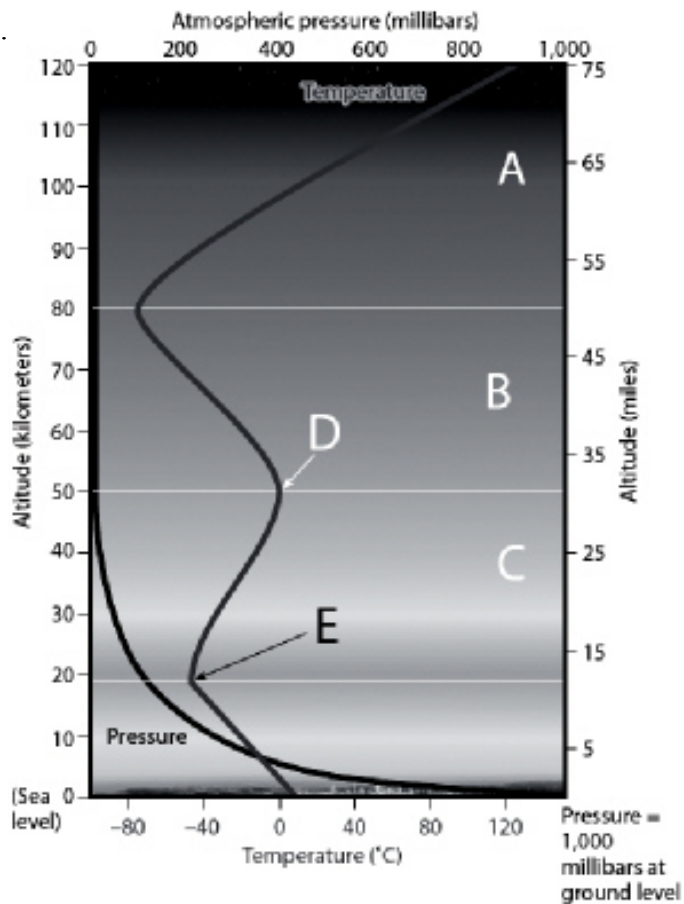


Atmospheric Layers

Use the Figure above to answer the following question(s).

Choose the letter that represents the boundary in the atmosphere between the troposphere and the stratosphere.

105.

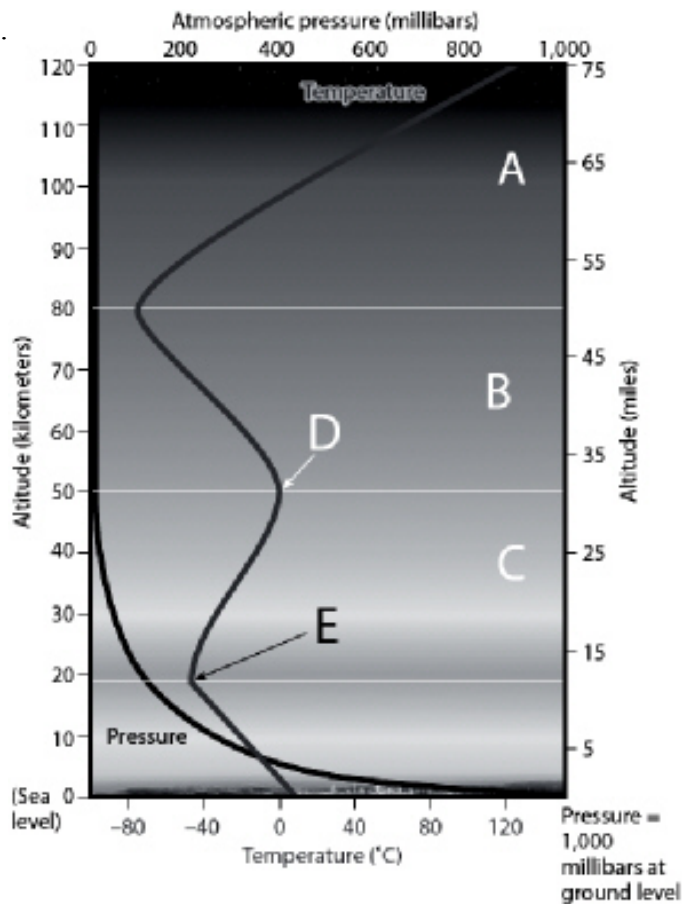


Atmospheric Layers

Use the Figure above to answer the following question(s).

Choose the letter that represents the area where air would be thin and temperatures vary greatly with solar activity.

106.

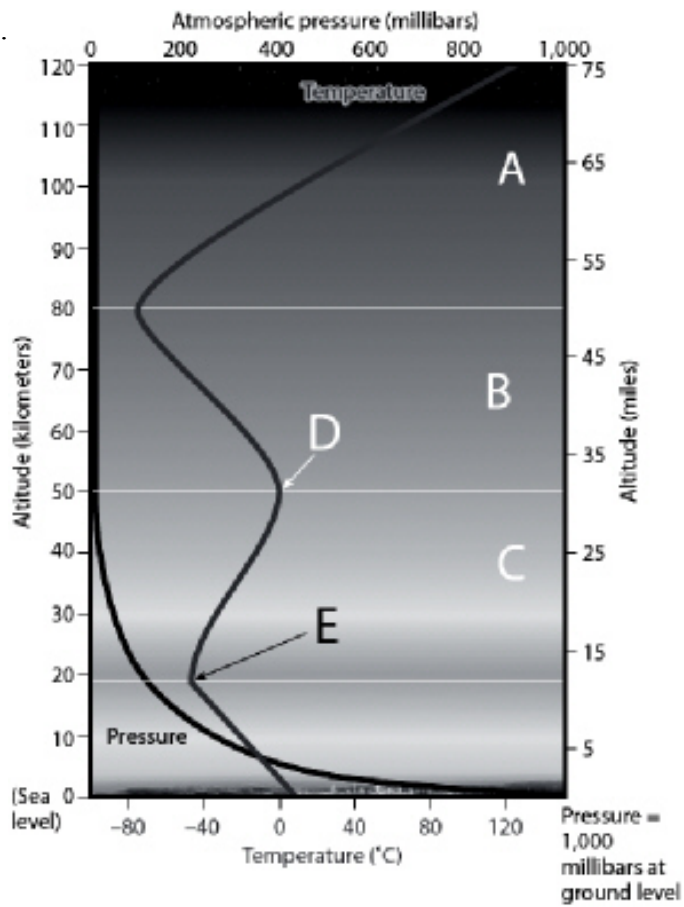


Atmospheric Layers

Use the Figure above to answer the following question(s).

Choose the layer that contains ozone, which keeps approximately 95% of the sun's ultraviolet radiation from reaching the earth's surface.

107.

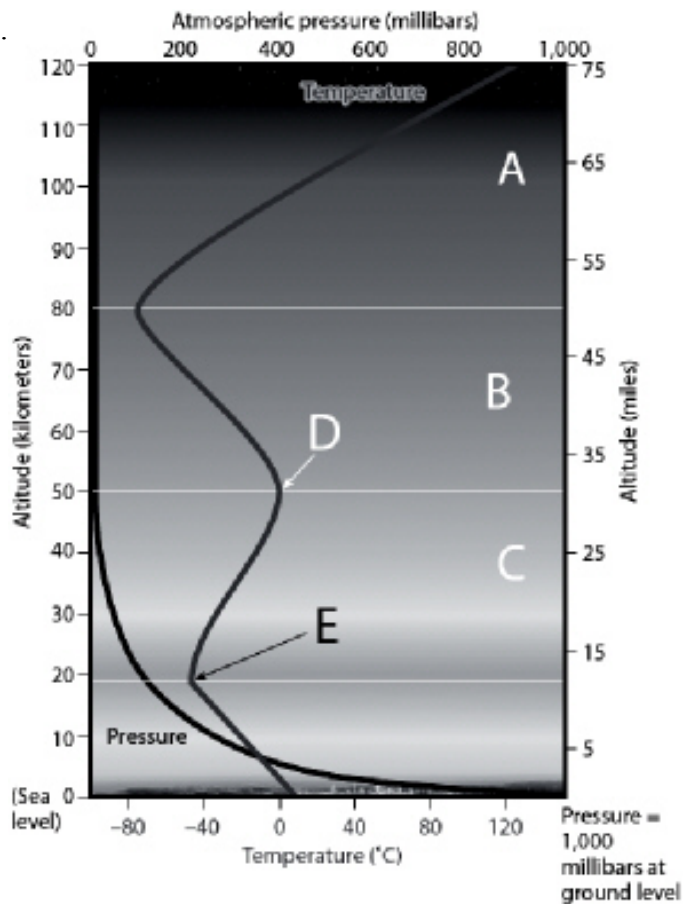


Atmospheric Layers

Use the Figure above to answer the following question(s).

Choose the layer that represents the separation of the mesosphere and stratosphere.

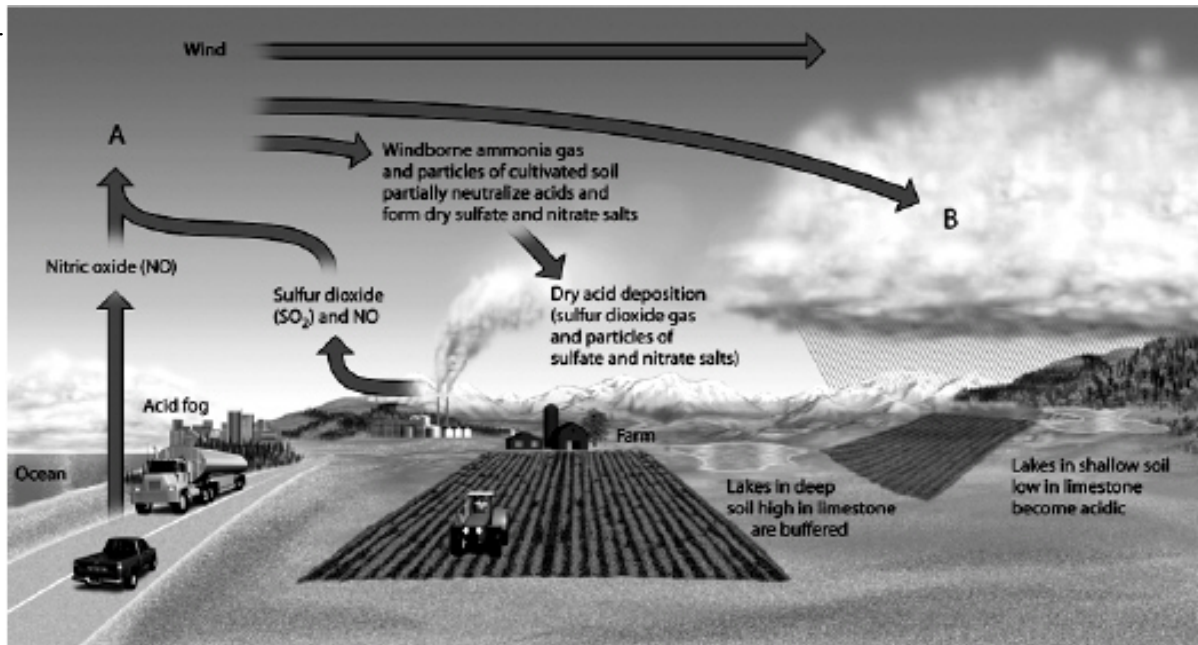
108.



Atmospheric Layers

Use the Figure above to answer the following question(s).

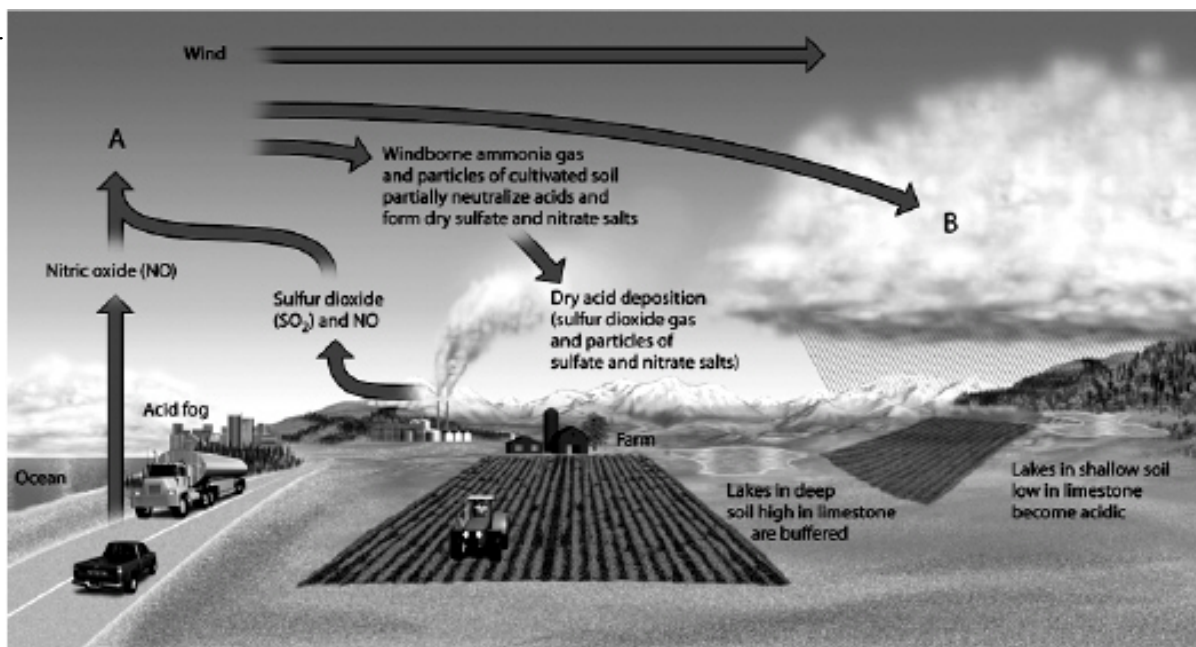
Choose the layer that represents part of the middle atmosphere in which temperatures vary greatly with altitude.



Acid Deposition

Use the Figure above to answer the following question(s).

On the figure above, choose the letter that represents the wet acid deposition.

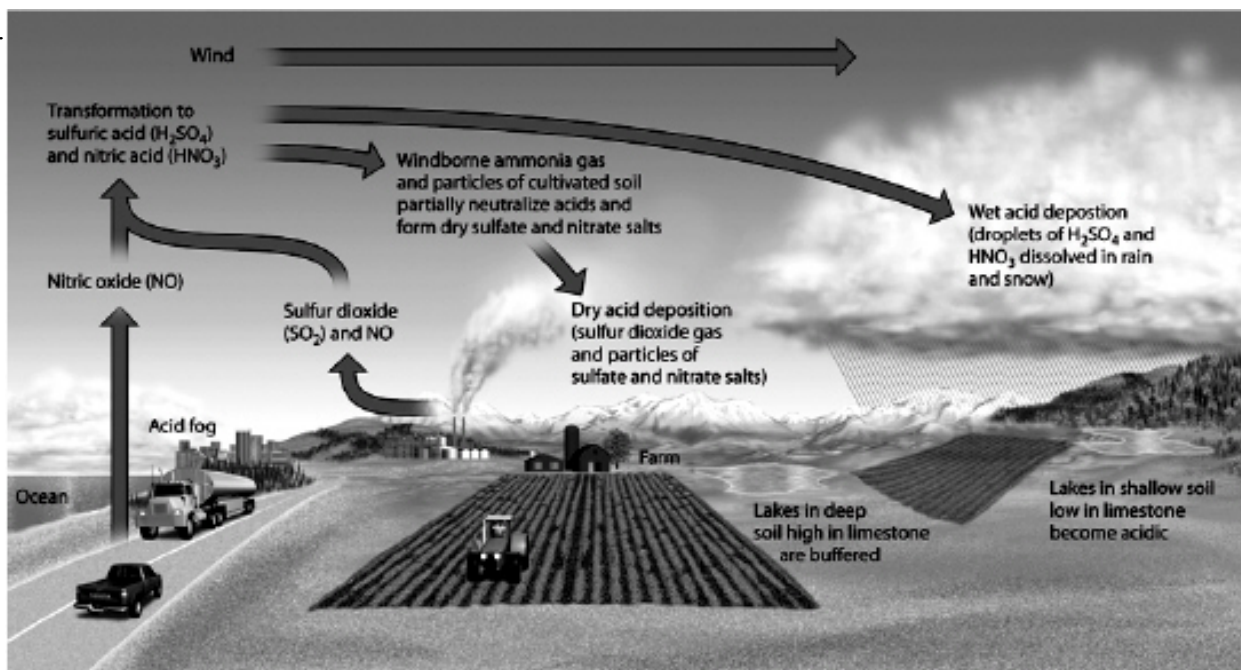


Acid Deposition

Use the Figure above to answer the following question(s).

On the figure above, choose the letter that represents the transformation to sulfuric acid and nitric acid.

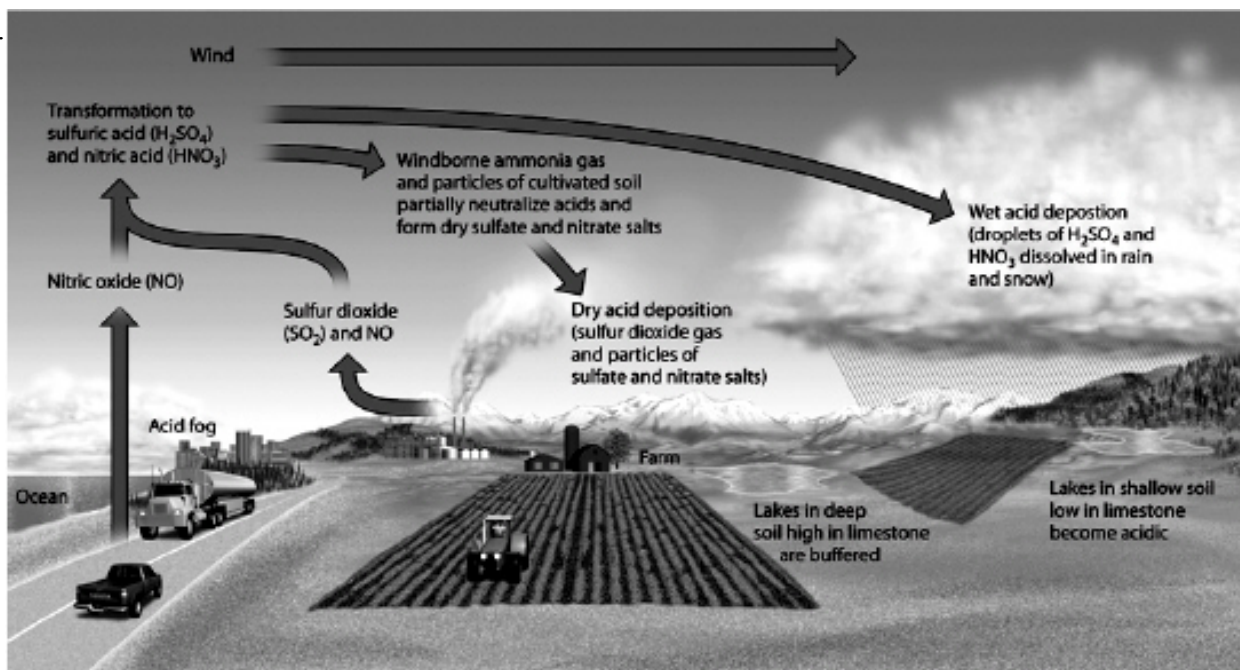
111.



Use the Figure above to answer the following question(s).

Based on the figure above, which chemicals are primarily responsible for lowering the pH of rain?

112.



Use the Figure above to answer the following question(s).

Based on the figure above, which lakes will be mostly affected by acid rain?

CHAPTER 18--AIR POLLUTION **Key**

1. E
2. A
3. D
4. B
5. C
6. D
7. A
8. C
9. A
10. D
11. C
12. E
13. E
14. D
15. C
16. B
17. D
18. C
19. A
20. B
21. A
22. D
23. A
24. C
25. D
26. C
27. E
28. D
29. B
30. C

- 31. E
- 32. C
- 33. B
- 34. C
- 35. D
- 36. D
- 37. A
- 38. D
- 39. C
- 40. C
- 41. B
- 42. A
- 43. C
- 44. A
- 45. D
- 46. E
- 47. E
- 48. E
- 49. D
- 50. B
- 51. E
- 52. C
- 53. B
- 54. D
- 55. FALSE
- 56. TRUE
- 57. TRUE
- 58. FALSE
- 59. FALSE
- 60. TRUE
- 61. TRUE
- 62. TRUE
- 63. TRUE
- 64. FALSE

- 65. TRUE
- 66. FALSE
- 67. FALSE
- 68. FALSE
- 69. TRUE
- 70. TRUE
- 71. FALSE
- 72. FALSE
- 73. TRUE
- 74. TRUE
- 75. FALSE
- 76. FALSE
- 77. TRUE
- 78. TRUE
- 79. TRUE
- 80. TRUE
- 81. FALSE
- 82. TRUE
- 83. TRUE
- 84. TRUE
- 85. FALSE
- 86. TRUE
- 87. TRUE
- 88. FALSE
- 89. 2 weeks *or* two weeks
- 90. Los Angeles, California, *or* Los Angeles, CA,
- 91. troposphere.
- 92. photochemical smog
- 93. volatile organic compounds
- 94. temperature inversion
- 95. industrial smog
- 96. Methane emissions
- 97. acid deposition
- 98. buffer

- 99. Formaldehyde
- 100. asthma
- 101. 125,000
- 102. cap-and-trade market approach
- 103. Clean Air Acts
- 104. E
- 105. A
- 106. C
- 107. D
- 108. B
- 109. B
- 110. A
- 111. Sulfuric acid and nitric acid are primarily responsible for lowering the pH of rain.
- 112. Lakes in shallow soil in limestone will be mostly affected by acid rain