

Make Flashcards

Chapter 12: Air Vocabulary

12.1: What Causes Air Pollution?

- **Air Pollution** – the contamination of the atmosphere by the introduction of pollutants from human and natural sources
Contaminación del aire – la contaminación de la atmósfera debido a la introducción de contaminantes provenientes de fuentes humanas y naturales
- **Primary Pollutant** – a pollutant that is put directly into the atmosphere by human or natural activity
Contaminante primario – un contaminante que es colocado directamente en la atmósfera por las actividades humanas o naturales.
- **Secondary Pollutant** – a pollutant that forms in the atmosphere by chemical reaction with primary air pollutants, natural components in the air, or both
Contaminante secundario – un contaminante que se forma en la atmósfera por medio de una reacción química con contaminantes primarios del aire, componentes naturales del aire o ambos
- **Smog** – urban air pollution composed of a mixture of smoke and fog produced from industrial pollutants and burning fuels
Esmog – contaminación urbana del aire, compuesta por una mezcla de humo y niebla producida por contaminantes industriales y combustibles
- **Temperature inversion** – the atmospheric condition in which warm air traps cooler air near Earth's surface
Inversión de la temperatura – la condición atmosférica en la que el aire caliente retiene al aire frío cerca de la superficie terrestre

12.2: Air, Noise, and Light Pollution

- **Sick-building syndrome** – a set of symptoms, such as headache, fatigue, eye irritation, and dizziness, that may affect workers in modern, airtight office buildings; believed to be caused by indoor pollutants.
Síndrome del edificio enfermo – un conjunto de síntomas, como dolor de cabeza, fatiga, irritación de los ojos y mareo, que puede afectar a las personas que trabajan en edificios modernos que cuentan con ventanas selladas; se cree que es producido por los contaminantes del interior del edificio
- **Asbestos** – any of six silicate minerals that form bundles of minute fibers that are heat resistant, flexible, and durable
Asbesto – cualquiera de seis minerales de silicato que forman montones de fibras diminutas que son resistentes al calor, flexibles y resistentes.
- **Decibel (dB)** – the most common unit used to measure loudness (abbreviation, dB)
Decibel – la unidad más común que se usa para medir el volumen del sonido (abreviatura, dB)

12.3: Acid Precipitation

- **Acid precipitation** – precipitation, such as rain, sleet, or snow, that contains a high concentration of acids, often because of the pollution of the atmosphere.

Chapter 12: Air Quiz

12.1: What Causes Air Pollution

1. Name 2 examples of natural air pollution
2. How does ground level ozone form?
3. What are the 2 types of particulate matter?
4. Where does most air pollution in urban areas come from?
5. What does the Clean Air Act give the EPA the authority to do?
6. What is a zero-emission vehicle?
7. What is an example of a partial zero-emission vehicle?
8. What does burning fossil fuels release huge quantities of?
9. What are 2 examples of Volatile Organic Compounds (VOCs)?
10. How does the scrubber pollution-control device remove harmful substances from the air?
11. How does an electrostatic precipitator remove dust particles?

9. What was asbestos primarily used for?

10. How do asbestos fibers cause asbestosis?

11. What are some health problems that can be caused by noise pollution?

12. Above what level of sound can continuous exposure cause permanent deafness?

13. What health problems can light pollution increase in humans?

14. What are 2 examples of solutions to inefficient lighting?

12.3: Acid Precipitation

1. What happens when oxides of sulfur and nitrogen combine with water in the atmosphere?

2. How great of a change in acidity does each change in whole number on the pH scale indicate?

3. Why is normal precipitation slightly acidic?

4. What happens when the acidity of soil increases?

Active Reading

Section 1: What Causes Air Pollution?

Read the passage below and answer the questions that follow.

Many industries and power plants that generate our electricity must burn fuel to get the energy they need. They usually burn fossil fuels. Burning fossil fuels releases huge quantities of sulfur dioxide and nitrogen oxide into the air. Power plants that produce electricity emit at least two-thirds of all sulfur dioxide and more than one-third of all nitrogen oxides that pollute the air.

Some industries also produce VOCs, which are chemical compounds that form toxic fumes. Some of the chemicals used in dry cleaning are sources of VOCs. Oil refineries, chemical manufacturing plants, furniture refinishers, and automobile repair shops also contribute to the VOCs in the air. When people use some of the products that contain VOCs, more VOCs are added to the air.

IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently, a main idea is accompanied by supporting information that offers detailed facts about main ideas.

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. What do most industries and power plants use for energy?
 a. VOCs
 b. nitrogen oxide
 c. sulfur dioxide
 d. fossil fuels
- _____ 2. What type of industry produces two-thirds of all sulfur dioxide that pollutes the air?
 a. air conditioning manufacturers
 b. dry cleaners
 c. long-distance trucking companies
 d. electrical power plants
- _____ 3. Which of the following does not produce volatile organic compounds (VOCs)?
 a. organic farm
 b. oil refinery
 c. furniture refinisher
 d. automobile repair shop
- _____ 4. What happens when people use a product that contains VOCs?
 a. They get very sick.
 b. Nothing happens.
 c. More VOCs are added to the air.
 d. The VOCs return to the atmosphere as carbon dioxide.

Active Reading *continued*

- _____ 5. Power plants that produce electricity emit
- a. sulfur dioxide and nitrogen oxide.
 - b. sulfur dioxide and VOCs.
 - c. nitrogen oxide and VOCs.
 - d. fossil fuels.

Read each question and write the answer in the space provided.

6. What are VOCs?

7. Reread the first four sentences of this passage. Given this information, do you think sulfur dioxide and nitrogen oxides in the air are harmful or beneficial? Explain your answer.

RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write the answer in the space provided.

8. Why do power plants emit such a high percentage of pollutants?

9. List four examples of industries that can be sources of VOCs in the air.

10. What percentage of pollutants do electrical power plants emit into the air?

11. What can you do to help reduce the amount of VOCs in the air?

Active Reading

Section 2: Air, Noise, and Light Pollution

Read the passage below and answer the questions that follow.

Several minerals that form in long, thin fibers and that are valued for their strength and resistance to heat are called asbestos.

Asbestos is primarily used as an insulator and as a fire retardant, and it was used extensively in building materials. The U.S. government banned the use of most asbestos products in the early 1970s. Exposure to asbestos in the air is dangerous. Asbestos fibers that are inhaled can cut and scar the lungs, which causes the disease asbestosis. Victims of the disease have more and more difficulty breathing and may eventually die of heart failure. Schools in the United States have taken this threat seriously. Billions of dollars have been spent to remove asbestos from school buildings.

IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently, a main idea is accompanied by supporting information that offers detailed facts about main ideas.

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. Long, thin fibers made of minerals that are valued for strength and heat resistance are called
- | | |
|--------------------|----------------|
| a. insulation. | c. asbestos. |
| b. fire retardant. | d. asbestosis. |
- _____ 2. Asbestos has been used mainly in
- | | |
|--------------------------------|-------------------------------|
| a. water treatment facilities. | c. commercial food packaging. |
| b. chicken farms. | d. building materials. |
- _____ 3. Why is asbestos used?
- | |
|---|
| a. to control unpleasant smells by neutralizing enzymes |
| b. to insulate and to serve as a fire retardant |
| c. to filter air for those who have damage to their lungs |
| d. to repair walls in old buildings |
- _____ 4. Why isn't asbestos used much in the U.S. today?
- | |
|---|
| a. The government banned the use of most asbestos products. |
| b. Inflation has made it too expensive for most people. |
| c. A better form of insulation has been discovered. |
| d. The original manufacturer went out of business. |

Active Reading *continued*

VOCABULARY DEVELOPMENT

Read each question and write the answer in the space provided.

5. Define *asbestos*.

6. Define *asbestosis*.

SEQUENCING INFORMATION

One reading skill is the ability to sequence information, or to logically place items or events in the order in which they occur.

Sequence the statements below to show the steps of the disease asbestosis. Write "1" on the line in front of the first step, "2" on the line in front of the second step, and so on.

- _____ 7. Asbestos fibers are inhaled.
- _____ 8. A person is exposed to asbestos in the air.
- _____ 9. The person has an increasingly difficult time breathing.
- _____ 10. Inhaled fibers cut and scar the person's lungs.
- _____ 11. The person may die of heart failure.
- _____ 12. The disease asbestosis develops.

RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write the answer in the space provided.

13. Why did people in the U.S. use asbestos in building materials before the 1970s?

14. Why would school officials spend money to remove asbestos from school buildings?

Active Reading

Section 3: Acid Precipitation

Read the passage below and answer the questions that follow.

Thousands of lakes throughout the world are victims of acid precipitation, which is also known as acid rain. Acid precipitation is precipitation such as rain, sleet, or snow that contains a high concentration of acids. When fossil fuels are burned, they release oxides of sulfur and nitrogen. When the oxides combine with water in the atmosphere, they form sulfuric acid and nitric acid, which fall as acid precipitation. This acidic water flows over and through the ground, and into lakes, rivers, and streams. Acid precipitation can kill living things, and can result in the decline or loss of some local animal and plant populations.

A **pH** (power of hydrogen) number is a measure of how acidic or basic a substance is. The lower the number on a pH scale, the more acidic a substance is; the higher a pH number is, the more basic a substance is. Each whole number on the pH scale indicates a tenfold change in acidity.

IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently, a main idea is accompanied by supporting information that offers detailed facts about main ideas.

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. In which of these forms does acid precipitation reach the surface of Earth?
- | | |
|-----------|------------------|
| a. light | c. precipitation |
| b. energy | d. oxides |
- _____ 2. What is harmed by acid precipitation?
- | | |
|-------------------------------|-----------------------|
| a. lakes, rivers, and streams | c. animal populations |
| b. plant populations | d. all of the above |
- _____ 3. What does acid precipitation contain that is harmful to living things?
- | | |
|-----------------------|----------------------------------|
| a. particulate matter | c. sulfuric acid and nitric acid |
| b. fossil fuels | d. calcium carbonate |

VOCABULARY DEVELOPMENT

Read each question and write the answer in the space provided.

4. What three forms can acid precipitation take?
- _____

Active Reading *continued*

5. When an author puts something in parentheses, he or she is often explaining the word or term that came just before. How does this author use parentheses to explain *pH*?

6. What does a pH number tell you?

SEQUENCING INFORMATION

One reading skill is the ability to sequence information, or to logically place items or events in the order in which they occur.

Sequence the statements below to trace the path of acid precipitation. Write "1" on the line in front of the first step, "2" on the line in front of the second step, and so on.

_____ 7. The oxides combine with water in the atmosphere.

_____ 8. Acid precipitation falls.

_____ 9. Sulfuric acid and nitric acid are formed.

_____ 10. The decline or loss of plant and animal populations can occur.

_____ 11. Fossil fuels are burned, releasing sulfur and nitrogen oxides.

_____ 12. Acidic water runs over and through the ground, and into lakes, rivers, and streams.

RECOGNIZING SIMILARITIES AND DIFFERENCES

One reading skill is the ability to recognize similarities and differences between two phrases, ideas, or things. This is sometimes known as comparing and contrasting.

Read the question and write the answer in the space provided.

13. What does it mean when something has a high pH level? a low pH level?

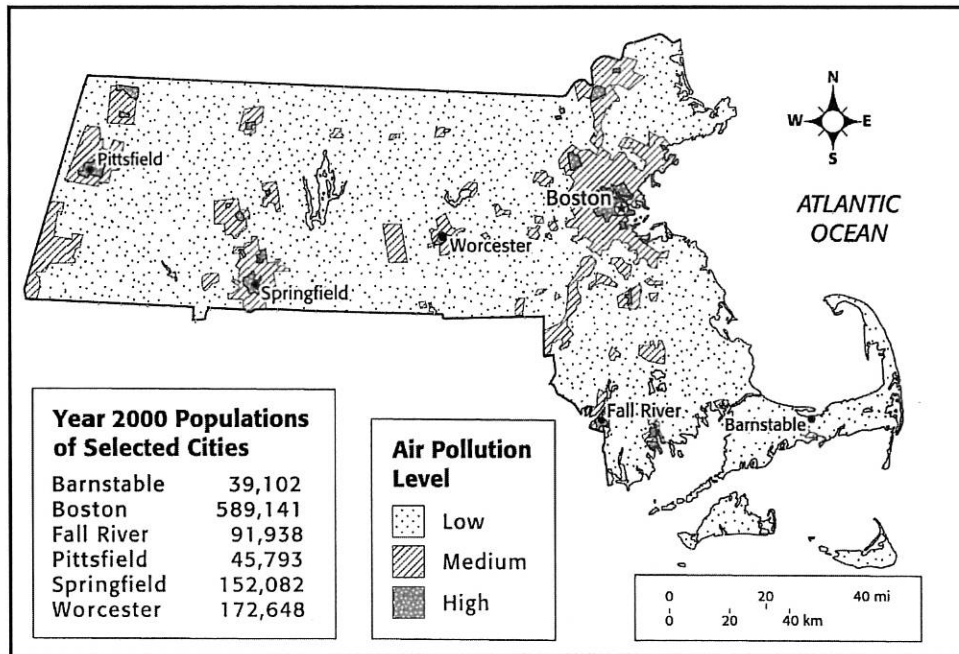
RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write the answer in the space provided.

14. What is the basic cause of acid precipitation? What are some effects?

Map Skills



This map shows air pollution in Massachusetts. Air pollution concentrates over populated areas because human activity is its primary cause.

Use the map above to answer the questions below.

1. **Using a Key** What air pollution level is found over most of the state of Massachusetts?

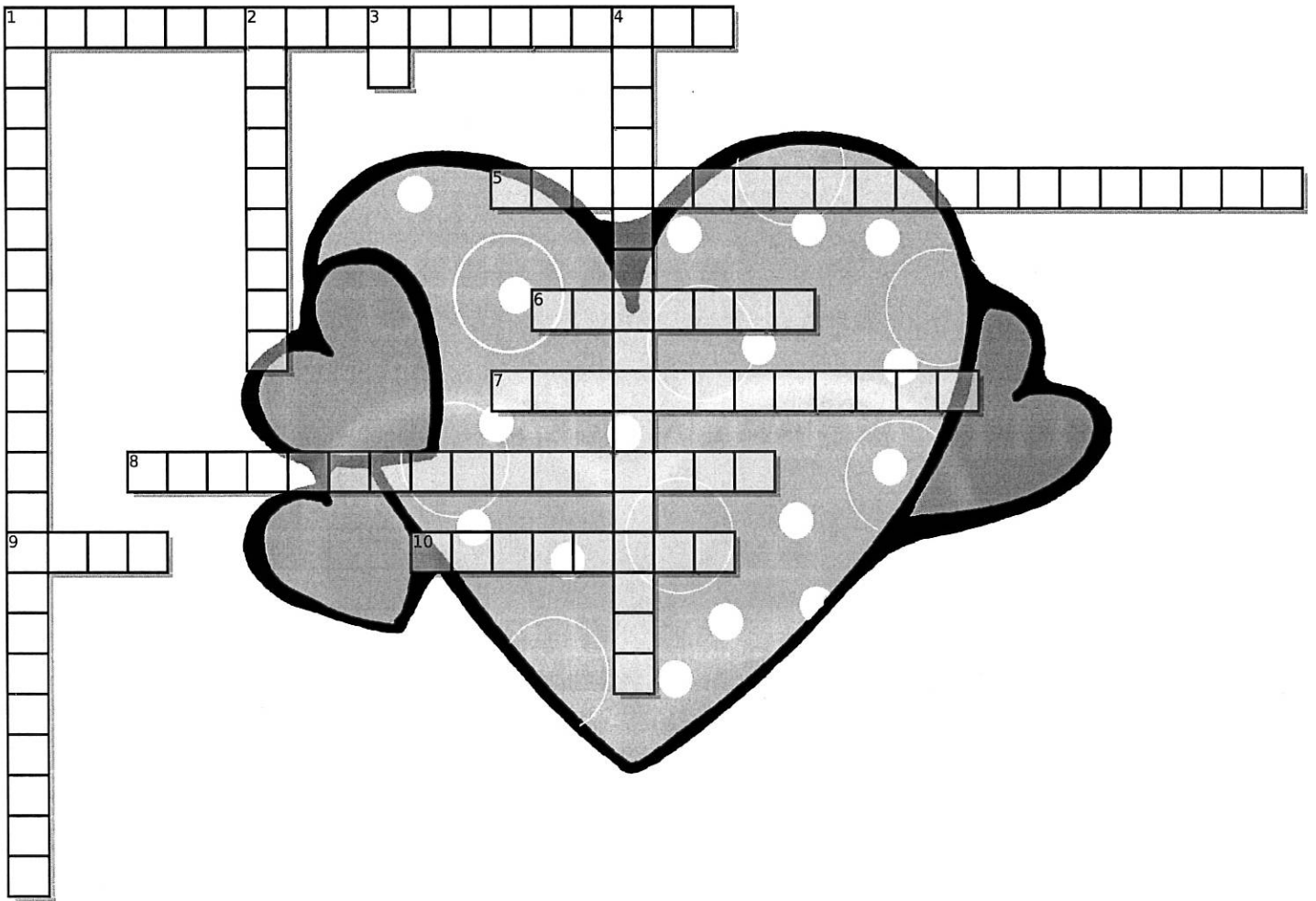
2. **Finding Locations** Which selected city has the lowest level of air pollution?

3. **Inferring Relationships** Generally, where are the highest levels of air pollution located?

4. **Making Conclusions** Explain the relationship between air pollution and human population.

5. **Making a Hypothesis** What do you think the air pollution level is over your region?

Chapter 12: Air



ACROSS

- 1 a pollutant that forms in the atmosphere by chemical reaction with primary air pollutants, natural components in the atmosphere
- 5 the atmospheric condition in which warm air traps cooler air near Earth's surface
- 6 the most common unit used to measure loudness (abbreviation, dB)
- 7 the contamination of the atmosphere by the introduction of pollutants from human and natural sources
- 8 a pollutant that is put directly into the atmosphere by human or natural activity
- 9 urban air pollution composed of a mixture of smoke and fog produced from industrial pollutants and burning fuels
- 10 any of six silicate minerals that form bundles of minute fibers that are heat resistant, flexible, and durable

DOWN

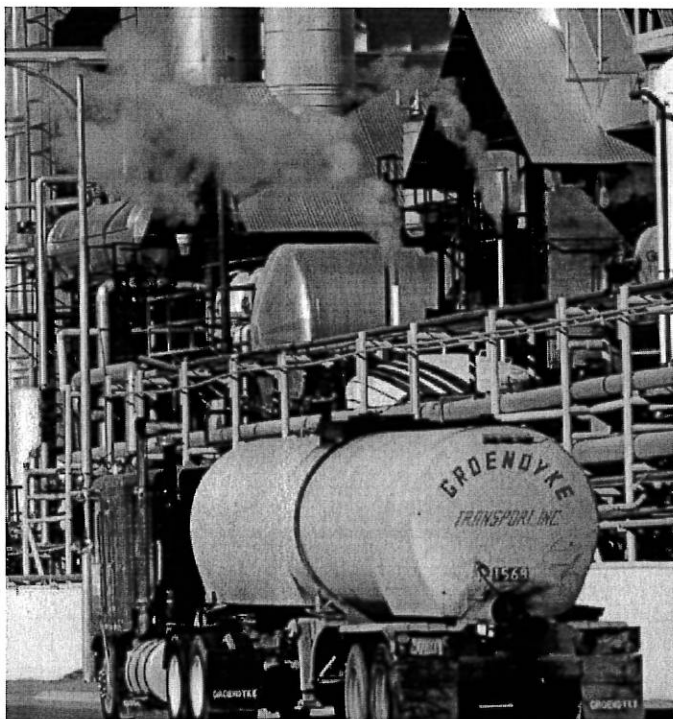
- 1 a set of symptoms, such as headache, fatigue, eye irritation, and dizziness, that may affect workers in modern, airtight office buildings; believed to be caused by indoor pollutants.
- 2 the sudden runoff of large amounts of highly acidic water into lakes and streams when snow melts in the spring or when heavy rains follow a drought.
- 3 a value that is used to express the acidity or alkalinity (basicity) of a system; each whole number on the scale indicates a tenfold change in acidity; a pH of 7 is neutral, a pH of less than 7 is acidic, and a pH of greater than 7 is basic.
- 4 precipitation, such as rain, sleet, or snow, that contains a high concentration of acids, often because of the pollution of the atmosphere.

CHAPTER 12 Enrichment

This Chapter Enrichment provides relevant and interesting information to expand and enhance your classroom instruction of the chapter material.

Air

SECTION 1 | WHAT CAUSES AIR POLLUTION?



Industry and transportation are the two main sources of urban air pollution

Moving Mountains to Fight Air Pollution

Lanzhou, China, has a terrible claim to fame—the air is actually gritty. Two million people live in this city in northwestern China, where smoke from coal and exhaust from cars combine with dust particles blowing off the region's dry, crumbling mountains. Because the city is located in the bottom of a valley, there is little chance for air to circulate. Nonsmokers who live in Lanzhou suffer the effects of smoking about a pack of cigarettes a day just from breathing the air. To help air circulation and to clean the air, the citizens of Lanzhou decided to move a mountain. Using explosives, 100 feet were removed from the top of a mountain in the late 1990s. However, the dust produced by the blast made air quality even worse. The environmental protection bureau of Lanzhou is investigating converting to unleaded gasoline, planting trees, and the use of cleaner forms of energy—natural gas, wind, solar, and hydroelectric power.

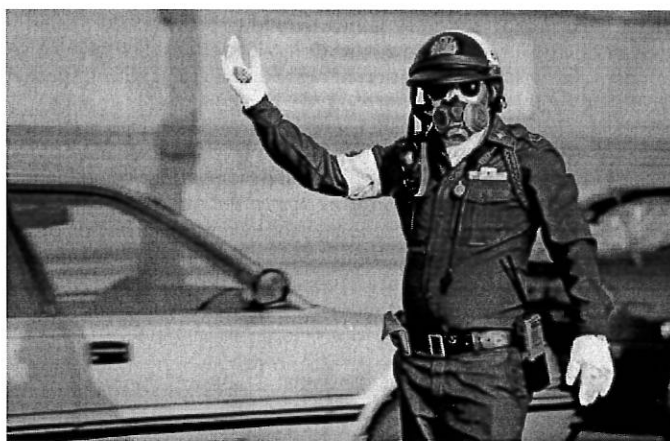
Solar Cars

Australia receives a lot of solar energy, so it makes a perfect setting for the World Solar Challenge. In this 3,000 km race across the country, teams of students and researchers enter cars that use solar power instead of gasoline. Automobile manufacturers often sponsor the designs of the cars. The first race, held in 1987, boasted 23 entrants. One of the more recent races had 37 participants. The winning car, a Japanese model, averaged 91.54 km/h (57.04 mph). It finished the race in 32 hours and 45 minutes. The race is all part of an effort to increase environmental awareness. It is also a chance for car manufacturers to put their names on some pretty fantastic designs!

Ethanol-Powered Cars in Brazil

During the oil shortage of the 1970s, Brazil, the world's largest producer of sugar, developed a line of cars that burned sugar cane-based hydrous ethanol, or alcohol, instead of gasoline. Alcohol is a clean-burning fuel. Cars in Brazil are no longer allowed to run on pure gasoline, and flexible-fuel vehicles (those that can run on any ratio of alcohol and gasoline) account for more than 90% of new car sales. Brazil is the world's largest exporter of ethanol fuel.

SECTION 2 | AIR, NOISE, AND LIGHT POLLUTION



A police officer directs traffic in Bangkok, Thailand

Chapter 12: Air Enrichment Questions

Moving Mountains to Fight Air

What did the citizens of Lanzhou do to help air circulation and to clean the air?

Solar Cars

What is the purpose of the World Solar Challenge?

Ethanol-Powered Cars in Brazil

What are cars in Brazil no longer allowed to run on?

Air Pollution in Mexico City

What are 2 factors that contribute to poor air quality in Mexico City?

The Indoor Air Quality in US Schools

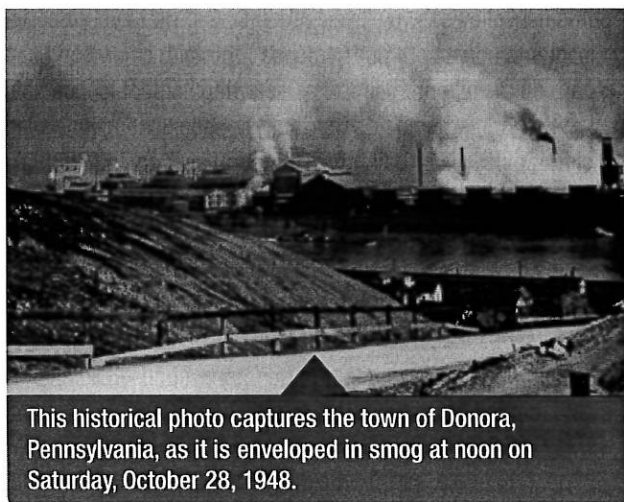
How many US schools suffer from problems related to poor indoor air quality?

Killer Smog

For the residents of the small Monongahela Valley town of Donora, Pennsylvania, living with the smoke that billowed from the local zinc smelter was an everyday occurrence—until October 26, 1948. On that night, a temperature inversion and an absence of wind began to trap a deadly mixture of sulfur dioxide, carbon monoxide, and metal dust that would hang in the valley air for five days. Over that period of time, 20 residents lost their lives and 7,000 other residents—about half of the town's population—suffered some form of respiratory problems.

The Weekend of the Killer Smog

By Saturday afternoon, October 29, 1948, the yellowish smog had become so thick that spectators in the stands at a local high school football game could not see the players on the field. Only the whistles of the referees could be heard. By nightfall, driving was unsafe. This proved to be catastrophic because doctors recommended that any residents who suffered from respiratory ailments be evacuated from town. In an attempt to alleviate the suffering of people who were struggling to breathe, several local firemen carried oxygen tanks through the streets to people's homes. Because of the low visibility, the firemen had to feel their way along buildings and fences. Because the supply of oxygen was limited, only a few breaths of oxygen could be given to each person. Eleven people died that night. A makeshift morgue was set up in the local community center.



This historical photo captures the town of Donora, Pennsylvania, as it is enveloped in smog at noon on Saturday, October 28, 1948.

Even as the killer smog choked the valley, the zinc smelter continued production throughout the night. The smelter continued sending more gases and dust into the air over Donora. The smelter was shut down only when the magnitude of the problem became apparent—at 6:00 a.m. on Sunday, October 30, 1948.

Later that day, a drizzling rain began to fall and washed the pollutants from the sky. By the time the rain fell, 20 people were dead. Thousands of other people were at home in bed or were filling the corridors and examining rooms of the two area hospitals. People who were less affected by the smog suffered from nausea and vomiting, headaches, and abdominal cramps. Some victims were choking or coughing up blood. The zinc smelter resumed operation on Monday morning, October 31.

The Aftermath

The smog of Donora was one of the United States' most serious environmental disasters. Shortly after the incident, the Pennsylvania Department of Health, the U.S. Public Health Service, and other agencies undertook investigations. This was the first organized attempt to document the effects of air pollution on health in the United States. The knowledge that air pollution could be linked directly to the deaths of individuals resulted in legislation at the local, regional, state, and federal levels. These laws were set to limit emissions of sulfur dioxide, carbon monoxide, particulate matter, and other pollutants. The greatest legacy of the Donora tragedy was passage of the Clean Air Act of 1970. According to a 2011 report, the direct benefits of amendments to the Clean Air Act of 1990 are estimated to be around \$2 trillion and 230,000 fewer deaths by 2020! This is a staggering benefit for the \$65 million direct cost of implementation.

What Do You Think?

Who do you think should be held responsible for the Donora, Pennsylvania, disaster? Explain your answer. Given what you know about the regulation of industrial pollutants under the Clean Air Act, do you think another incident such as the Donora killer smog could happen in the United States today?

Chapter 12: Killer Smog

1. What caused the smog to become trapped in the Monongahela Valley?
2. What did the local firemen do in response to the smog?
3. What did people who were less affected by the smog suffer from?
4. Around how much money has the Clean Air Act saved the US?

Skills Worksheet

Critical Thinking**ANALOGIES**

In the space provided, write the letter of the pair of terms or phrases that best complete the analogy. An analogy is a relationship between two pairs of words or phrases written as $a : b :: c : d$. The symbol $:$ is read "is to," and the symbol $::$ is read "as."

- _____ 1. scrubber : smokestack ::
a. ZEV : smog
b. catalytic converter : tailpipe
c. VOCs : gasoline pumps
d. car seats : vinyl chloride
- _____ 2. particulate matter :
primary pollutant ::
a. asbestos : radon
b. ground-level ozone :
secondary pollutant
c. sulfur dioxide : fossil fuels
d. VOC : smog
- _____ 3. temperature inversion :
smog ::
a. sick-building syndrome
:indoor air pollution
b. ZEV : emissions
c. catalytic converter : emissions
d. carpets : formaldehyde
- _____ 4. radon : lung cancer ::
a. ozone : VOCs
b. ventilation : indoor pollution
c. asbestos : fire retardant
d. noise pollution : hearing loss
- _____ 5. shielding : light pollution
::
a. mold: indoor pollution
b. scrubber : noise pollution
c. SO₂ : acid precipitation
d. ZEV : air pollution
- _____ 6. acid precipitation : Canada-
U.S. Air Quality Agreement ::
a. sick building syndrome : ZEV
b. air pollution : Clean Air Act
c. ventilation : sick-building
syndrome
d. sea-coal : medieval air pollution
- _____ 7. bronchitis : emphysema ::
a. fossil fuel : nuclear power
b. ZEV : VOC
c. pneumonia : lung cancer
d. lumens : light pollution
- _____ 8. 10 dB : 40 dB ::
a. pH 2 : pH 5
b. pH 7 : pH 5.6
c. 40 dB : 50 dB
d. pH 1 : pH 10
- _____ 9. acid precipitation : sulfur ox-
ides, nitrogen oxides, water ::
a. air pollution : dust, pollen, spores
b. ozone : vehicle emissions,
sunlight, oxygen
c. VOCs : smog
d. light pollution : sodium lamps
- _____ 10. vehicles, industry : outdoor air
pollution ::
a. nitrogen, oxygen : volcanoes
b. farming, fires : construction
c. ear protection : noise pollution
d. plastics, building materials : indoor
air pollution

Skills Worksheet

Study Guide**MATCHING**

In the space provided, write the letter of the term or phrase that best matches the description.

- | | |
|--|----------------------------|
| _____ 1. ground-level ozone | a. primary pollutant |
| _____ 2. scrubber | b. secondary pollutant |
| _____ 3. radon gas | c. indoor air pollution |
| _____ 4. nitrogen oxides | d. pollution control |
| _____ 5. decreased pH | e. acid precipitation |
| _____ 6. possible long-term effect of air pollution | f. temperature inversion |
| _____ 7. necessary to control acid precipitation | g. lung cancer |
| _____ 8. atmospheric condition trapping pollution | h. deafness |
| _____ 9. possible short-term effect of air pollution | i. international agreement |
| _____ 10. possible long-term effect of noise pollution | j. nausea |

MULTIPLE CHOICE

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- | | |
|--|---|
| _____ 11. Which of the following is an example of a primary pollutant?
a. ground-level ozone
b. soot from smoke
c. radon
d. All of the above | _____ 12. Which of the following would be a potential cause of sick-building syndrome?
a. acid precipitation
b. smog
c. fungi
d. all of the above |
|--|---|

Study Guide *continued*

- _____ 13. Catalytic converters, scrubbers, and electrostatic precipitators are examples of
- technologies used to treat sick-building syndrome.
 - technologies used to counteract the effects of acid precipitation on aquatic ecosystems.
 - technologies used to capture radon gas.
 - technologies used to control pollution emissions.
- _____ 14. During a temperature inversion,
- sulfur oxides and nitrogen oxides combine with water in the atmosphere.
 - an influx of acidic water causes a rapid change in the pH of water.
 - levels of ground-level ozone decrease.
 - pollutants are trapped near Earth's surface.
- _____ 15. What is *not* a consequence of acid precipitation?
- an increase in the pH of soil and water
 - the death of aquatic plants and animals
 - the destruction of calcium carbonate in building materials
 - a change in the balance of soil chemistry
- _____ 16. High blood pressure and stress are both human health effects linked to
- smog.
 - air pollution.
 - light pollution.
 - noise pollution.
- _____ 17. Oil refineries and gasoline stations are both sources of
- particulate matter.
 - volatile organic compounds.
 - smog.
 - All of the above
- _____ 18. Uranium-bearing rocks underneath a house can be a source of
- ozone.
 - asbestos.
 - radon.
 - formaldehyde.
- _____ 19. An increase in the pH of a lake would most likely indicate
- the lake suffers from acid shock.
 - calcium carbonate has been released into the lake.
 - the area in which the lake is located suffers from acid precipitation.
 - higher than average sulfur oxide levels in the atmosphere.
- _____ 20. Acid precipitation is formed when
- sulfur oxides or nitrogen oxides combine with water.
 - sulfur oxides combine with nitrogen oxides.
 - ozone combines with automobile exhaust.
 - nitric or sulfuric acids combine with ozone.

Acids, Bases, and Salts

Intro:

Acids and bases are all around us. Many are found in our kitchen. Let's take a look at some common items you might see. Substances that are acids are often described as being acidic, and substances that are bases are described as being basic. Have you noticed how all of the items that you have seen are in liquid form? A substance is not an acid or a base until it is _____ in water.

1. We are going to explore what makes a substance an acid or a base. If you have ever tasted lemon juice, you know it is sour. The sour taste results from citric _____, which citrus fruits contain. A baker knows that baking soda has a bitter taste, so cake and cookie recipes are adjusted to eliminate the bitterness.
2. Lemon Juice: Pink →
Blue →
Baking Soda: Pink →
Blue →
3. Unknown W: Pink →
Blue →
Unknown X: Pink →
Blue →
Unknown Y: Pink →
Blue →
Unknown Z: Pink →
Blue →
4. When acids and bases dissolve in water, they both form _____. This process is called ionization. Acids and bases form different types of ions. Let's take a closer look at hydrochloric acid.
5. What is the common ion that forms when hydrochloric acid and nitric acid are dissolved in water?
6. What is the common ion that forms when sodium hydroxide and potassium hydroxide are dissolved in water?
7. Which is a stronger acid, Hydrochloric acid (HCl) or Formic acid (HCOOH)?
8. Which is a stronger base, Potassium Hydroxide (KOH) or Ammonia (NH₃)?
9. Litmus paper only determines if a solution is acidic or basic. It does not indicate the strength of the acid or base. To determine how strong an acid or base is, we use pH paper. The pH is a measure of the _____ ion, H₃O⁺, concentration in a solution.