

Chapter 7: The Atmosphere

I. The Atmosphere

A. What is it?

The atmosphere is a thin layer of gases that surrounds the earth.

B. What is it made up of?

The atmosphere is made up of

- 78% Nitrogen

- 21% Oxygen

- 1% water vapor, argon, neon, carbon dioxide, helium & other gases

C. Layers

1. Troposphere

- Extends from the earth's surface to about 6 miles up

- Contains 90% of atmosphere's gases

- The air we breathe is here

- Weather happens here

2. Stratosphere

- Just above the troposphere

- Extends above the troposphere about 30 miles

- Airplanes travel here

- Ozone layer is here – it protects us from UV radiation

3. Mesosphere

- 30-50 miles up

- Coldest layer ; -148°F

4. Thermosphere

- 50-310 miles up

- Hottest layer ; 3632°F

5. Exosphere

-310 miles and up

-It gets thinner and thinner until it merges with outer space

D. Atmosphere and Change

A. What was the early atmosphere probably like?

-Early atmosphere contained very little oxygen

B. Why was there a drastic change?

-The change occurred because living things appeared

-Bacteria that did photosynthesis took carbon dioxide from the atmosphere and released oxygen

II. Climate

A. What is weather?

-It is what is happening in the atmosphere at a particular place at that moment.

Examples: rain, fog, windy

B. What is climate?

-The average weather in an area over a period of time.

1. What are some of the important aspects of climate?

-temperature, humidity, wind and precipitation

2. What determines climate?

a) latitude

1) What is it?

-Latitude is the distance from the equator

-it is measured in degrees north or south of the equator

2) How does it affect climate?

-Latitude affects climate because the closer your location is to the equator the more direct sunlight and area receives

b) air circulation

1) What 3 things should you know about air circulation?

-Cold air sinks and warms as it sinks

-warm air rises and cools as it rises

-warm air can hold more water vapor than cold air

*heating of the atmosphere caused wind or movement in the atmosphere

*because different latitudes receive different amounts of solar energy...global air circulation patterns are set up

c) ocean circulation patterns

1) Why do they affect climate?

-water holds a lot of heat

-movement of ocean currents are caused by winds and the rotation of the earth

-coastal climates tend to be more moderate due to the ocean circulation patterns

d) local geography

1) Why does it affect climate?

-geography is any land form that influences climate

Ex: hills, mountains, water

-as you go up in elevation temperatures go down

-mountains influence the distribution of rain

3. Seasonal changes

a) Why are there seasonal changes?

-The earth's orbit around the sun

-The tilt of the earth

-During the spring and summer the northern hemisphere tilts toward the sun

-During the fall and winter the northern hemisphere is tilted away from the sun

III. Greenhouse Earth

A. What is the greenhouse effect?

-An idea that the Earth and its atmosphere are acting like a greenhouse

-sunlight streams through the atmosphere and heats the earth

-some heat is trapped near earth by the troposphere and warms the earth

B. What are some greenhouse gases?

-water vapor

-CO₂

-CFC's

-methane

-NO_x

- C. Why is there more carbon dioxide in our atmosphere today?
-Human activities
- D. Where is all the carbon dioxide coming from?
-decaying plants, burning fossil fuels, burning of living plants
- E. What naturally cycles carbon dioxide from our atmosphere?
-photosynthesis done by plants
 $\text{CO}_2 + \text{water} + \text{light} \rightarrow \text{sugar} + \text{O}_2$
- F. Global warming
1. What is it?
-The predicted increase in Earth's temperatures due to an increase in greenhouse gases in the atmosphere
 2. What evidence do scientists have that global warming is occurring?
-climatologists have measured the amounts of carbon dioxide in our atmosphere and yearly temperatures
-el nino
-unusual weather patterns
 3. Effects of global warming...
 - a) On weather patterns
-oceans will absorb more heat causing more hurricanes and typhoons
-change in ocean currents
-change in rainfall amounts
-drought and flooding
 - b) On agriculture
-hotter and drier Midwest
-poor crop yields

- c) On sea levels
 - polar regions warm and melt icebergs
 - coasts covered in water

- d) How can we slow down temperature change?
 - burn less fossil fuels
 - preserve forests

IV. Ozone Shield

A. What is good ozone?

- O₃ in the stratosphere

B. Why is it important?

- it absorbs UV light from the sun
- UV light can damage genetic material in cells
- the ozone layer protects us from the sun

C. What destroys ozone?

- CFC's – a manmade chemical that can last in the atmosphere 150 years after being released

1. How does it occur?

- UV light breaks up CFC
- A Cl atom is released
- Cl atom reacts with the ozone to make chlorine monoxide
- Chlorine monoxide also reacts with the ozone
- this cycle keeps happening over and over

2. 4 things are needed to make a hole in the ozone layer
 - very cold air
 - still air
 - acid in the air
 - Cl or Br atoms in air

D. The ozone hole

1. Where is it?

- Above the South Pole; Antarctica

2. When is it visible?

- August – December during Antarctic spring

3. What problems can be associated with more contact with UV rays?

- more UV rays reach earth's surface
- UV rays can damage DNA in cells
- UV can cause skin cancer & cataracts
- UV can kill unicellular organisms and disrupt food chains
- a decrease in unicellular organisms, which are photosynthesizers, could affect CO₂ levels
- weaken immune systems
- lower crop yields
- loss of species

E. What is being done to stop the reduction of the ozone layer?

- Montreal Protocol was created to reduce CFC production in 1987
- By 1995 eliminate CFC's
- develop a fund to research alternatives to CFC's
- aerosol cans and refrigerants no longer use CFC's