Air: Gas Exchange

Remember to **practice** with the study questions on the BIOL 101 web site and remember to take the wordlist 7 quiz.

Acid precipitation

Alveolus (-i)

CFCs

CH_4

CO

CO_2

Diffusion

Emissions

Global warming

Hydrocarbons

Mucociliary escalator

O_2

O_3

Oxides

NO_x

Particulates

pH

Photochemical smog

Respiratory disease

Smog

SO_2

Stratosphere

Temperature inversion

Troposphere

UV radiation

Questions

1. Which of the above terms are on the Smog Check Vehicle Inspection Report (check at a gas station)?

2. About pH:
   a. The pH scale goes from _____ to _____.
   b. Acids are pH _____ to _____.
   c. Bases are pH _____ to _____.
   d. A pH of 5 is _____ times more acidic than a pH of 6; a pH of 4 is _____ times more acidic than a pH of 6.

3. "The Fog" is a medical detective essay by Berton Roueché available on the BIOL 101 web site. Read the essay and be able to answer the following questions:
   a. Was the diagnosis verified? How many cases were reported? How was the diagnosis verified?
   b. Was the outbreak considered an epidemic? Why?

c. Describe the outbreak by Time, Place, and Person Factors. Describe the population at risk by age, sex, occupation, exposure to specific foods, ethnicity, and where the outbreak occurred.
d. How many possible sources were considered (hypotheses tested)? Who was at highest risk of acquiring the disease?
e. Did you find the investigation interesting? Were you surprised by the findings?
f. What was special about the fog in Donora this time? Why hadn't this happened before?

4. Look in the Weather section of the daily newspaper for the Air Quality Index. What is the cleanest place in the Bay Area?___ The smoggiest? _____ Date _____

5. Diagram the carbon cycle. In doing so, explain how carbon enters the living system and how it leaves, indicate the role of microorganisms in the cycle, and identify the reservoir for carbon. In the context of global warming, describe how humans are affecting the carbon cycle.?

pH

It is convenient to express the amount of H^+ in a solution by a logarithmic pH scale, which ranges from 0 to 14 (See figure). The **pH** of a solution is the negative logarithm to the base 10 of the hydrogen ion concentration in moles per liter, $[H^+]$, or $-\log_{10}[H^+]$.

For example, if the H^+ concentration of a solution is 1.0×10^{-4} moles/liter, or 10^{-4}, its pH equals $-\log_{10}(10^{-4}) = -(-4) = 4$; this is about the pH of wine. In the laboratory, however, you will usually measure the pH of a solution with a pH meter or with chemical indicator papers, eliminating the need for calculations.

Acidic solutions contain more H^+ ions than OH^- ions and have a pH lower than 7. If a solution has more OH^- ions than H^+ ions, it is **basic**, or **alkaline**. In pure water, a small proportion of the molecules are dissociated into H^+ and OH^- ions, giving it a pH of 7. Since the concentration of H^+ and OH^- ions are equal, this pH is said to be **neutral**.

Since the pH scale is logarithmic, a change of one whole number represents a tenfold change from the previous concentration. This, a solution with a pH 1 has 100 times more H^+ ions than a solution with a pH 3, and 10 times more H^+ than one with a pH 2.