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What's in the Air?

Most of us have occasionally noticed a brownish looking haze on the horizon. The sky is supposed to be blue, not brown. So what is all that stuff? Air is actually a mixture of gases and particles. It may surprise you to know that air is mostly made of the two gases nitrogen (78%) and oxygen (21%). All of the other gases in air, including pollutants, make up less than 1% of the air. Although gaseous pollutants make up only a tiny percentage of the air, they have profound effects on the weather, the environment, and human health.

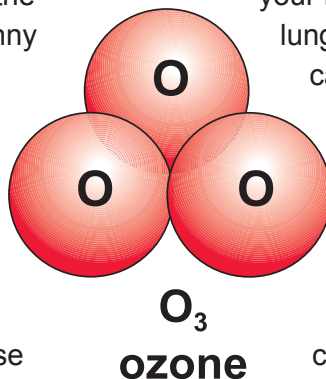
A harmful gas that pollutes the air that we breathe is called ozone (O_3). Oxygen is O_2 . Ozone is found in many places in our atmosphere. The ozone found high up in the stratosphere is “**good ozone**” because it protects living things from the sun’s harmful rays. “**Bad ozone**” is formed in the troposphere near the ground on hot, sunny days. Sunshine and warm temperatures cause other chemical pollutants such as nitrogen oxides and volatile organic chemicals (VOCs) to react with one another to produce ozone. Ozone is harmful and it can damage your lungs if you breathe lots of it. It is best to reduce your level of strenuous exercise outside on days when ozone levels are high. Your town or city may let you know when ozone levels are high by declaring an “Ozone Action Day.” There are actions you can take to help reduce the levels of ozone on Ozone Action Days.

Air also contains particles. Particles are tiny bits of liquids or solids that are floating in the air. These particles can be visible or invisible and often consist of living things such as pollen, bacteria, and viruses. Nonliving particles that float in the air include things like dirt, soot, and industrial chemicals. In fact, little bits of rubber even fly into the air from car tires and contribute to particle

pollution. Particles come from a variety of sources, including coal-burning power plants, factories, construction sites, cars, trucks, buses, farm fields, unpaved roads, stone crushing, and the burning of wood. Other particles may be formed in the air when gases emitted from burning fuels react with sunlight and water vapor.

The particles that pollute our air vary in shape and size. Particles 10 microns or smaller in size are of concern. Scientists have found that the smaller particles (those 2.5 microns or less in diameter) may be the most harmful to human health. The size of a human hair is about 60 microns in diameter. Small particles are harmful because they go deep into your lungs and you are not able to cough them up. Once particles are deep in

your lungs, they can aggravate parts of your lungs, making it hard for you to breathe, or cause an allergic reaction. If too many cancer-causing chemicals settle deep in your lungs, there is an increased risk of developing lung cancer. Long-term exposure to ambient, airborne particulate matter is associated with increased mortality, largely due to cardiovascular and respiratory problems.



Monitoring of the gases and particles in the air is important to determine if we are meeting air quality standards and if industries are complying with their air permits. Many questions need to be asked before starting a monitoring program. The most basic question is “What are we trying to find out?” This leads to:

- WHY? (objectives, problems addressed)
- WHERE? (locations)
- WHEN? (frequency and duration)
- HOW? (sampling techniques, tests, equipment, observations)

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Questions:

1. What gases make up most of the air around us (ambient air)?

2. Oxygen molecules have _____ atoms and ozone molecules have _____ atoms.

3. What is "good" ozone?

4. What is "bad" ozone and how is it formed?

5. What are particles and why are they of concern to human health?

6. What questions need to be answered before setting up a monitoring program?
