

Smog – Its Causes and Dangers

What is smog?

The word “smog” was coined in the early 1900s as a combination of the words “smoke” and “fog”. In the present day, we understand more of what smog truly is. Generally, it is a combination of pollutants in the air, primarily ground-level ozone (a compound of three atoms of oxygen). While we are more familiar with ozone as a good thing (the ozone layer in the upper atmosphere, about 10 to 30 miles above the Earth’s surface, protects our planet from the harmful ultraviolet rays of the Sun), when it is in the air we breathe, near the ground, it is considered a pollutant. Ground-level ozone is produced when sunlight catalyzes reactions between volatile organic compounds (VOCs) and nitrogen oxides in the air. VOCs are produced by gasoline, paints, and cleaning solvents, among other sources while nitrogen oxides come from such sources such as car exhaust, coal power plants, and factory emissions. In urban areas, at least half of all ozone-producing pollutants are generated by motor vehicles (cars, buses, trucks, and boats). The combination of heavy traffic, high temperatures, sunshine, and calm winds leads to extreme smog events because smog can form faster and be more severe at high temperatures while a lack of wind means the pollutants aren’t carried away. In fact, smog is worse in the summer months and in geologic basins, in which smog becomes trapped. Most cities in the United States with populations over 250,000 have experienced smog problems. Worldwide, the cities most affected by smog include Athens, Beijing, Hong Kong, Houston, London, Los Angeles, Mexico City, New York, and Toronto.

What are the effects of smog?

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people simply have an unusually high susceptibility to smog effects. Around one-third of the United States population falls into at least one of these categories.

How is smog measured?

Smog is measured as the concentration of ozone in parts per million (ppm), or the number of volumetric units in a million units of total air mass. In the United States, a nationwide monitoring system is in place, with over one thousand stations recording concentrations of ozone and other pollutants. The United States Environmental Protection Agency has developed the Air Quality Index, an index of ozone concentrations and the level of danger associated with each. The index ranges from 0 to 500, with higher numbers corresponding to greater danger. Levels above 300 are rare in the US. However, approximately 90 million Americans live in areas with ozone levels above what is considered safe for human health. Concentrations used in the index are generally measured as 8-hour average values.

Air Quality Index (AQI):

Good (0-50): 0.0-0.064 ppm

Moderate (51-100): 0.065-0.084 ppm

Unhealthy for Sensitive Groups (101-150): 0.085-0.104 ppm

Unhealthy (151-200): 0.105-0.124 ppm

Very Unhealthy (201-300): 0.125 (8-hr average)-0.404 (1-hr average) ppm

On smoggy days, individuals should keep their outdoor activity levels low, while at ozone concentrations above 300, it is advised that physical exertion of any kind outdoors be avoided.

What can be done to reduce smog?

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mandates involve motor vehicle emissions and include changes in gasoline composition, alternative fuels, traffic restrictions, carpool and public transit programs, emissions fees for vehicles, and older vehicle buyback programs. In addition, some local governments have banned charcoal barbecues and wood burning in stoves and fireplaces in times of high pollution or restricted the release of certain chemicals by factories and personal burning of lawn refuse.

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Reading Comprehension Questions:

1. What
2. How is ground-level ozone produced?
3. The
4. How does smog specifically affect humans and other animals?
5. Which
6. What AQI range should you be below if you are in the "Sensitive Group"?
7. Legislative mandates

Extension Questions:

8. In some countries,
9. What are some things you think people should do to reduce smog? You can't simply use the examples given in the reading. Should these factors be enforced or suggested? If you think they should be enforced, how would this happen?
10. Go to - <http://aqicn.org/> and research the

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TWF READING

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