

# [Ozone half of the largest urban areas in](https://assignbuster.com/ozone-half-of-the-largest-urban-areas-in/)

OzoneDanielle FarrarMarch 16, 1997Triatomic oxygen, O3, is most commonly known as ozone. It has aresonance structure, and can be drawn in two different ways: O= O-O-O= OIt is a bluish, explosive gas at room temperature, and has a boiling pointof -119C. It has a melting point of -193C, and is a blue liquid.

It’scritical temperature and pressure are -12. 1C and 53. 8 atm, respectively. Ithas a pleasant odor in concentrations of less than 2 ppm, and is irritating andinjurious in higher concentrations. The density of ozone gas is 2.

144 g/L, andthe density of ozone as a liquid is 1. 614 g/mL. It is extremely unstable, andsolutions containing ozone explode upon warming. It is found in varyingproportions on Earth, but it is about 0. 05 ppm at sea level. Ozone absorbs harmful ultraviolet radiation in the upper atmosphere, andprotects humans from skin cancer. But ozone is also the main ingredient of smog, and causes serious health effects and forest and crop damage in the loweratmosphere. Ozone is formed through the chemical reaction of volatile organiccompounds and nitrogen dioxide, in the atmosphere, in the presence of sunlight.

This reaction is called a photochemical reaction, because sunlight is required. The product is known as smog. The notorious brownish color of smog is due tonitrogen dioxide of the mixture. Increased temperature stimulate the reaction, which is why ozone conditions are worse in the summer. It is an oxidant, meaning it takes electrons away from other molecules, and disrupts keystructures in cells by starting chain reactions. Ozone is a serious national problem. Half of the largest urban areas inthe United States exceed the ozone standards.

The worst regions in the USinclude California and the Texas Gulf coast, and the northeast and the Chicago-Milwaukee area during the summer. The ozone condition varies from year to year, as the temperature and weather fluctuate. This fluctuation also occursthroughout the day, as emissions from morning traffic builds up, the levels rise. Ozone emissions come from many things, such as automobiles, gas stations, powerplants, dry cleaners, paint shops, chemical manufacturing pants, oil refineries, and other business that release volatile organic compounds. The health effects of ozone are chest pain, coughing, wheezing, lung andnasal congestion, labored breathing, sore throat, nausea, rapid breathing, andeye and nose irritation. The symptoms occur when the levels of ozone are onlyslightly higher than the legal standard.

Living in San Diego during myelementary school year, I personally felt the effects of ozone; the tightness ofthe chest, wheezing, and labored breathing on certain hot, humid days. Dayswould be labeled “ smog days”, and children wouldn’t be able to play outsideduring recess, the air was so polluted. Heavy exercise can drive ozone deeperinto the respiratory system, and interferes with lung operation, and childrengrowing up in smog-polluted areas have been found to have lost 10-15% of theirlung capacity. Ozone severely damages crops, forests, and man-made materials.

Thecrops affected are ones such as soybeans, peanuts, corn, and wheat, and moreextensively to tomatoes, beans, snapbeans. Cash losses of these crops areestimated at several billion dollars a year. Evidence points towards the factthat ozone is severely damaging forest in the eastern United States, and ozoneis responsible for the reduced growth rate of commercial yellow pines in thesoutheast U. S. Organisms such as lichens, and ecosystem processes such asnutrient cycling, are also affected. Ozone can also damage materials, such ascausing cracking of plastics and rubber, and decomposition and fading of fibersand dyes. Ozone has been in the news a lot in the past decade or so.

Not only theeffects of ozone as smog in the lower atmosphere, but ozone depletion in theupper atmosphere. It seems rather ironic that something we have such anabundance of that it becomes a problem, should also present the problem that weare lacking in it. However, the focus of my research was primarily on smog andthe effects of the lower atmosphere. The health problems presented, the moneylost on crops, and forests, have made ozone quite a prevalent issue, mainlybecause it affects everyone, all over the planet.

This invisible gas has andwill continue to be a source of intense interest for scientists in the comingyears. Contributing pollutants such as automobiles, power plants, and other thingsI mentioned previously have led to controversy over these items. Huge amountsof money have been put into research for decreasing the amount of ozone produced. For instance, Los Angeles installed a