

Negative Impacts of Ground Level Ozone on Human Health and the Environment

I. Introduction

1. Background information:
 - a. High concentrations affects the human respiratory system
 - i. Acerbating existing respiratory diseases/conditions
 - ii. Reduces quality of respiration
 - iii. Causes a high mortality rate
 - b. Key component of photochemical smog (Ali 2006)
 - c. Ozone is not released directly into the atmosphere
 - i. Chemical reactions involve sunlight, oxides of nitrogen, oxides of hydrogen, and hydrocarbons (Seeley et al. 2005)
 - ii. Occurs at a very fast rate
2. Thesis: When tropospheric ozone is at elevated concentrations, it affects the respiratory system by acerbating existing respiratory diseases/conditions, reducing quality of respiration, and causing a high mortality rate. Along these same lines, ground level ozone has similar effects on agriculture.

II. General symptoms

1. Ozone damage can occur without any noticeable signs
2. Ozone continues to cause lung damage even when the symptoms have disappeared
3. The best way to protect your health is to find out when ozone levels are elevated in your area

III. Respiratory symptoms

1. General effects on the lungs
 - a. Makes it more difficult to breathe
 - b. Causes shortness of breath and pain when taking deep breaths
 - c. Makes the lungs more susceptible to infection
 - d. Causes coughing and sore scratchy throat
 - e. Causes permanent lung damage
2. Specific effects on lungs
 - a. Inflames and damages airways
 - b. Causes muscles in the airway to constrict, trapping air in the alveoli
 - i. This leads to wheezing and shortness of breath
 - ii. Painful coughing
 - c. Ozone can inflame and damage cells that line your lungs
 - i. Within a few days, the damaged cells are replaced and the old cells are shed
 - ii. Ozone may aggravate chronic lung diseases
 1. Such as emphysema and bronchitis
 2. Reduce the immune system's ability to fight off
3. Can cause several diseases (increases likelihood)
 - a. Chronic obstructive pulmonary disease
 - b. Asthma
 - c. Chronic bronchitis
4. Leads to high mortality rates

IV. Effect on Agriculture

1. Ozone symptoms usually occur between the veins on the upper leaf
 - a. Especially for older and middle-aged leaves
 - b. Surface of leaf
2. Type/severity of injury is dependent on several factors
 - a. Duration and concentration of ozone exposure
 - b. Weather conditions
 - c. Plant genetics
3. The destruction of plant species will not only lead to
 - a. The endangerment of those plants
 - b. Negative domino effect on the earth
4. The endangerment (or possibly extinction) of these plant species will lead to:
 - a. Food and oxygen shortages
 - b. The endangerment of the animals who feed on those plant species
 - i. Lead to certain species losing their habitats
 - ii. Possible extinction
5. These events would then lead to the destruction of ecosystems and food chains

V. Effect on Agriculture cont.

1. Ozone typically enters through the stomata of the plant
2. Chlorosis
 - a. A disease where the chlorophyll in green parts of the plant is destroyed
 - b. Plant cannot conduct photosynthesis at an efficient rate
3. Necrosis
 - a. Plant disease where the tissues of the plant die
 - b. Organs will die
4. Interfering with plant abilities
 - a. Produce/store food
 - b. Immune system
 - i. More susceptible to certain diseases
 - ii. Higher likelihood of organ death
5. Damaging the leaves of trees and other plants
 - a. Reddening
 - b. Flecking
 - c. Bronzing
6. Potentially impacting species diversity in ecosystems.

VI. Islamic Perspective

1. Hadith about
 - a. How helping one person is like helping all of mankind
 - b. Moving something from the path of a person is a charity
 - c. Abu Musa story
2. Quran
 - a. Sura Luqman
 - b. Sura Israa

VII. How to Prevent Ozone

1. Vapor recovery nozzles at the gasoline pumps to reduce refueling emissions
2. Cleaner burning gasoline reformulated to reduce VOC, NOx and other pollutants
3. Strict NOx emission limits for power plants and industrial combustion sources
4. Enhanced vehicle inspection programs in states
5. Strict limitations on the solvent usage in factories

VIII. Conclusion:

1. Tropospheric ozone can be harmful to the human body
 - a. Affects the respiratory system
 - i. Reducing the quality of respiration
 - ii. Causing a high mortality rate
 - b. Get sunburn in lungs
 - i. Cells will shed
 - ii. Higher likelihood of lung cancer
2. Tropospheric ozone negatively affects agriculture
 - a. Plant diseases
 - i. Necrosis
 - ii. Chlorosis
 - b. Organ Damage
 - i. Speckling
 - ii. Bronzing
 - iii. Reddening
3. Ground level ozone ruins mankind's relationship with Allah (SWT)
 - a. Allah (SWT) tells mankind in the Quraan to preserve the earth because it is a blessing
 - b. Allah (SWT) established cleanliness as a key principle in being Muslim
 - c. There is still hope to improve the environment
 - i. Take many precautions
 1. Carpooling
 2. Use clean paints/cleaning equipment
 - ii. Protect yourself
 1. Look at Air Quality website
 2. Act accordingly
 - d. Protecting our environment from tropospheric ozone will not only help us live on a healthy earth, but also improve our relationship with Allah (SWT)