

0.3 ppm. appears to be the threshold level at which nose and throat irritation begins. However, exposure to ozone concentrations of 1.0 to 3.0 ppm. for a period of two hours produces extreme fatigue and lack of coordination in central nervous system.

Aromatic hydrocarbons which are conducive to smog formation pose a greater threat than the alicyclic hydrocarbons. Their vapours are much more irritating to the mucous membranes and their inhalation causes systematic injury to the trachea.

Peroxybenzoyl nitrate, PBN, a secondary photochemical pollutant, occurs in polluted atmosphere involving aromatic hydrocarbons, NO_x and ozone. It acts as a powerful eye irritant and lachrymator.

Smog might be causing some serious health problems. Modern office machines such as fax, photocopiers, and printers, can create ozone, which reacts with various commonly found chemicals to produce volatile organic compounds. These agents are found in automobile exhausts and help in creating photochemical smog, a smog formed when a plethora of pollutants react in the presence of light and affect the upper respiratory tract of commuters. Inside offices, this smog is more dangerous. Deodorants and perfumes widely used by office staff also contribute to the problem. A perfume may contain even more than 100 different organic ingredients, all of which gradually evaporate. Also, there are solvents from dry cleaned clothes, paint work on office walls, and from the glue that keeps comfortable padded chairs together.

The powerful adhesives that hold down floor tiles and the stains that make desks look like mahogany, all contribute to the creation of air borne soup of organic volatile compounds. Among these compounds are hydroxyl radicals that tear apart other chemicals, creating harmful substances such as CH_3COOH and HNO_3 . These attacks humans and machines alike. They can coat the chips inside computers destroying them in the process.

EFFECTS OF PHOTOCHEMICAL OXIDANTS ON PLANTS

PAN and other members of its family (PBN, PPN etc.) are produced photochemically in air having olefins and NO_x . It is very damaging to plants, attacking younger leaves and bringing about **bronzing** and 'glazing' of their surfaces. **Photochemical smog is characterized by brown hazy fumes** which leads to cracking of rubber and extensive damage to plant life. Exposure for several hours to PAN, atmosphere at the level 0.02 to 0.05 ppm causes a great loss to vegetation. The **sulphydryl** group present in proteins has been susceptible to damage by PAN. It acts both as an oxidising and acetylating agent while reacting with sulph hydryl groups contained in proteins.

Experimental results indicate that ozone is the most toxic photochemical oxidant. Among visible effects of ozone injury to plants are bleached or light flecks or stipples (clusters of dead cells) on the upper surface of leaves. Fully expanded, mature leaves are more susceptible to damage. Leaves tip burn, a disease of white pines is mainly caused by ozone.

Smog which contains O_3 , PAN and other photochemical oxidants is regarded to produce early maturity in plants. A six hour exposure of this smog even at a very low concentration of 0.01 ppm. is reported to cause injuries to petunia, lettuce and pinto bean, citrus, forge and salad crops and coniferous trees. PAN causes injury in beets, spinach, pepper, lettuce, alfalfa, aster and primrose etc. It also causes silvering of leaves. NO_x and PAN cause death to forest trees. Actually PAN inhibits **Hill reaction** of photosynthesis and ozone promotes excessive transpiration from the leaves of plants causing dehydration. All these pollutants also destroy the cells of leaves, damage the shoots and interfere with the plant's metabolic processes. Ozone, together with PAN form small drops in air forming smog, thus blanketing the sunshine which inhibits the rate of

photosynthesis in plants. Ozone is also harmful for vegetables like radish, carrot, tobacco and carnation.

These oxidants (O_3 and PAN) have also been found to inhibit the activity of enzymes that are responsible for the synthesis of cellulose and lipids in plants.

Some sulphates and nitrates which are formed during smog formation due to the oxidation of sulphur containing components (SO_2 and H_2S) and NO_x (N_2O_3 , N_2O_5 , NO_2), nitric acid and some nitrates are important toxicants of smog. They adversely affect plant growth, damage crops and live stock.