

## **ENVIRONMENTAL STUDIES**

### **LECTURE-39**

#### **Photochemical Smog**

Photochemical smog, also known as summer smog, is a type of smog that is produced when UV light originating from the sun interacts with the oxides of nitrogen present in the atmosphere. This type of smog usually manifests as a brown haze and is most commonly seen in highly populated cities that are placed in relatively warm climates. Furthermore, photochemical smog is most prominently visible during the mornings and afternoons.

#### **How is Photochemical Smog Formed?**

Photochemical form is formed by a complex series of chemical reactions involving sunlight, oxides of nitrogen, and volatile organic compounds that are present in the atmosphere as a result of air pollution. These reactions often result in the formation of ground level ozone and certain airborne particles. The formation of photochemical smog is closely related to the concentration of primary pollutants in the atmosphere. It is also related to the concentration of secondary pollutants (in some cases).

Common examples of primary pollutants that contribute towards photochemical smog include oxides of nitrogen such as nitric oxide, nitrogen dioxide, and nitrous oxide and most VOCs (volatile organic compounds). Common examples of secondary pollutants that contribute towards the formation of photochemical smog include aldehydes, tropospheric ozone, and peroxyacyl nitrates (often abbreviated to PAN).

During peak-traffic hours in the morning, large amounts of nitrogen oxides and volatile hydrocarbons are released into the atmosphere. These pollutants can be traced to automobile emissions and industrial discharge. Some of these hydrocarbon pollutants rapidly undergo oxidation by the hydroxyl groups in the atmosphere, resulting in the formation of peroxy radicals. These peroxy radicals go on to convert nitric oxide into nitrogen dioxide.

#### **What are the Effects of Photochemical Smog?**

Photochemical smog has a number of negative effects on the environment and human beings. The chemicals contained within it, when combined with hydrocarbons, form molecules which cause eye irritation. The atmospheric radicals interfere with the nitrogen cycle by stopping ground level ozone from being eliminated. Ground level ozone can prove to be extremely toxic

to human beings. Other negative symptoms associated with photochemical smog include decreased vision and shortness of breath.

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