



ENVIRONMENTAL AND HEALTH EFFECTS OF OZONE LAYER DEPLETION

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ABSTRACT

In our world most of the human activities effect on the environment, which causes soil pollution, water pollution, air pollution and depletion of Ozone layer is one of them. By which a hole is created into Ozone layer which affect our environment. The objective of this paper is to see the origin, cause and effect of Ozone layer depletion. CDC is one of the main reason for depletion of Ozone layer, so the U.V radiation fall on earth directly which affects environment and becomes cause of many human diseases. In future Ozone layer may recover because we can see in during lockdown without human activity Ozone layer started recovering itself.

Keywords: Ozone, Ozone layer depletion, Effect on environment, Protection, etc.

INTRODUCTION

Ozone is a layer which is present in our atmosphere in high cone of O₃. It observes almost or we can say 93% radiation of sun rays which are harmful for human health [1]. Ozone layer is present 12-50 km above earth in the atmosphere which gives us a negative (-) lapse rate [2]. Ozone layer was discovered in 1913 and it was discovered by “Charles Fabre” and “Henri Buisson”. A spectrometer is used “Dobson Meter” which is used for measuring total amount of Ozone in a colon overhead.

Ozone It is essential for human as well as animal life without Ozone layer human being as well as animal can't survive on earth. The build-up of oxygen gives us Ozone in the atmosphere. Ozone layer is present in stratosphere. As a thick layer is formed and it gives us a more advanced life. It is observed that in harmful radiation of the sun generally oxygen is present in diatomic form O₂ into the atmosphere which is reason for our breath but by research it is found that if in atmosphere 10 million molecular are present than 2 million are present into the form of O₂ molecules and 3 million molecules are present into the form of triatomic as O₃. The oxygen rich layer which is present into the stratosphere is known as “Ozone Layer” and some amount of oxygen is present at the lower atmospheric layer such as “troposphere” is due to human activities on earth.

Ozone hole we have listened this word in lower closed that means the Conc of O₃. at a point is very low where the radiation of sun light can easily pass is known as “Ozone Hole” [4]. Technically the term “Ozone hole” should be applied to regions where stratospheric Ozone depletion is so sever that levels fall below 200 Dobson Unit (D.U). the traditional measure of stratospheric Ozone . Normal concentration of Ozone is 300-350 D.U. In the research it is found that Ozone depletion takes place in Antarctica which causes global warming and melting of glazers takes place.

Ozone layer it is not actually a layer but it is a region where the concentration of oxygen is rich in stratosphere above the 12-30 mile of earth [5]. If the Ozone layer wasn't present then the ultraviolet rays of sun would not be stopped and can diseases enter the earth which causes human diseases like “Eye problem and skin cancer”. The main reason for depletion of Ozone layer is CFCs which was discovered in 1970s. It is already told that 10 PPM of O₃ is found into the stratosphere. When radiation strikes to the O₂ molecule it splits and formation of O₃ molecule take place. This process is known as “Photolysis”. Reason for depletion of Ozone layer is not only CFCs but also of radiation of sunlight and chemical reaction of chlorine and fluorine in atmosphere. Manufactured chemical, especially manufactured chemicals hydrocarbons refrigerants, propellants and foam-blowing agents [cfc5, HCFC5]. Referred to as Ozone depleting substance (OD).

Ozone layer depletion In India

According to SK Srivastava, head of National Ozone Centre in New Delhi, there is no fend to show total Ozone depletion over India. Thaphyl and SM Kukshresta at the Indian Meteorological Department also point out that for the period 1956-1986 “Ozone measurements exhibits year to year variability but do not show any increasing or decreasing trend over India. Former director of the national Ozone centre K Chatterji now with development alternatives, warns that there is no case for complacency. He assists that his calculations exhibit an Ozone depletion trend in the upper layers of the stratosphere over New Delhi and Pune from 1980 to 1983 in the month of October when the Anturctic Ozone hole is at it's maximum. Ozone level are lowest during November and December and the highest in summer across the country, variation do exist. In kodaikanal, the total Ozone is 240 to 280 Dobson Unit (DU) in New Delhi 270320 DU and in Srinagar 290-360 DU.

Measuring Ozone Depletion Generally we use Dobson spectrometer to measure the concentration of Ozone in stratosphere. We use unit as Dobson Unit (DU). This unit is given by G.M.S Dobson who was earliest studies on Ozone in the atmospheric from the 1920s – 1970s. This Dobson spectrometer measures the thickness of Ozone layer would be if it were compressed into one layer at o Celsius and with a pressure of one atmosphere above it. The average amount of Ozone which is found in stratosphere is about 300 DU.

Maximum Ozone Concentration The maximum Ozone concentration of Ozone is between 20 km – 25 km (about 12-15 miles) above the surface. The layer of maximum Ozone concentration in the stratosphere is referred to as the Ozone layer. The Ozone layer varies with latitude.

EFFECT OF OZONE LAYER DEPLETION

(a) Effect on human and animal's health:

- Ozone layer depletion increases the amount of UV radiation (UV-B) that reaches the earth surface.
- Laboratory studies demonstrate that the UV-B causes non-melanoma skin cancer and plays a major role in malignant melanoma development.
- UV-B has linked to the development of cataract, a clouding of the eye's lens.
- Certain skin cancer is also caused due to these harmful U.V rays.
- Immunity to disease has also been effected due to the increase in UV-rays entering the atmosphere. The depletion of Ozone and increase in UV rays can also lead to DNA damage which can be 60 catastrophic

(b) Effect on Aquatic Eco Systems

More than 30% of the world's animal protein for human consumption comes from the sea alone. It is feared that increased level of UV exposure can have adverse impacts on the productivity of aquatic system. Ozone depletion causes increase in UV rays effects on aquatic system by:

1. Decreasing the abundance of phytoplankton the absorption of Co₂.
2. Decreasing the diversity of aquatic organisms which reduces food stock and also destroys several fish and amphibians.

With a few exceptions, changes in UV-B radiances due to factor such as clouds now and ice cover and UV penetration into water bodies have a more significant effect on ecosystem than UV changes due to Ozone depletion over the last 3 decades.

International action [for protection of Ozone]

In 1985, the world's governments adopted the Vienna convention for the protections of Ozone layer. Under the conventions Montreal protocol, government, scientist and industry worked together to cut out 99% of all Ozone-depletion substances. Thank for the Montreal protocol, the Ozone layer is healing and expected to return the pre- 1980 values by mid-century. In support of the protocol, the Kigali amendment which comes into face in 2019, will work towards reducing. Hydro fluorocarbon (HFC5), green house glasses with powerful climate warming potential and damaging to the environment.

Montreal protocol

The principal aim of Montreal protocol is protect the Ozone layer by taking measures to control total global production and consumption of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge and technological information. It is structured around several groups of Ozone -depleting substances. The group of chemicals is classified according to the chemical family and is listed in annexure to the Montreal protocol text. The protocol requires the control of nearly 100 chemicals in several categories.

Ozone day

World Ozone day, held on September 16, celebrates this achievement. It shows that collective decisions and action guided by science are the only way to solve major global crises. In this year of the covid-19 pandemic that has brought such social and economic hardship, the Ozone treaties message to working together in harmony and for the collective good is more important than ever. The slogan of the day "OZONE

FOR LIFE” reminds us that not only Ozone is crucial for life on earth but that we must continue to protect the Ozone layer of future generation.

REFERENCES

1. The science of the Ozone hole (<http://www.atm.ch.com.ac.uk/tour/part3.html>).
2. Ozone layer and its depletion; <https://youtu.be//llri0tqt11o>
3. Albritton, denial. “What should be done in a science assessment in protecting the Ozone layer: Lessons, Models and Prospects.” 1998. [2] allied Signal corporation. “Remarks,” International CFC and Halon
4. Antarctic Ozone hole; (http://www.nas.nasa.gov/About/Education/Ozone_/antarctic.html)
5. Stratospheric Ozone depletion by chlorofluorocarbons (Nobel Lecture) – Encyclopedia of Earth; (http://www.eoearth.org/articl20.A/Stratospheric_Ozone_Depletion_by_Chlorofluorocarbons)
6. Measuring Ozone depletion; http://www.enviropedia.org.uk/Ozone_Depletion/Measuring.php
7. Antarctic Ozone hole area and data; <http://ourworldindata.org/Ozone-layer>
8. Effect on Ozone layer depletion; <https://www.slideshare.net/PratikJain136/Ozone-layer-72907269>
9. Montreal protocol; <https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/the-montreal-protocol-on-substances-that-deplete-the-Ozone-layer/>
10. Ozone day; <https://www.un.org/en/observances/Ozone-day>