International Research Journal of Natural and Applied Sciences
ISSN: (2349-4077)
Impact Factor 7.032 Volume 9, Issue 11, November 2022
Website- www.aarf.asia, Email : editor@aarf.asia , editoraarf@gmail.com

OZONE LAYER DEPLETION: CAUSES & CONSEQUENCES

SUMAN LATA, GOVT. RAZA P.G. COLLEGE RAMPUR

Email- sumanlecturer@rediffmail.com

ABSTRACT: The ozone layer is found in the lower portion of the earth's atmosphere. It has the potential to absorb around 97-99% of the harmful ultraviolet radiations coming from the sun that can damage life on earth. If the ozone layer was absent, millions of people would develop skin diseases and may have weakened immune systems. However, scientists have discovered a hole in the ozone layer over the Antarctica. This has focused their concern on various environmental issues and steps to control them.

Keywords Ozone layer, Ultraviolet radiations, immune system

INTRODUCTION: The majority of the UV light from the Sun is absorbed by the Earth's stratosphere's ozone layer, referred as the ozone shield. In comparison to other areas of the atmosphere, it has a highest concentration of ozone (O_3). The average of ozone concentration in the Earth's atmosphere is approximately 0.3 parts per million, whereas the O_3 layer has a concentration of fewer than 10 parts per million. Although its thickness varies seasonally and geographically, the O_3 layer is primarily located in the lower region of stratosphere, from about 15 to 35 kilometres (9 to 22 mi) above Earth's surface[1]. Charles Fabry and Henri Buisson, two French physicists, made the discovery of the ozone layer in 1913. Measurements of the sun revealed that, aside from the absence of radiation below a wavelength of about 310 nm at the ultraviolet end of the spectrum, the radiation emitted from its surface and reaching the ground on Earth is typically consistent with the spectrum of a black body with a temperature in the range of 5,500–6,000 K (5,230–5,730 °C). It was concluded that something in the atmosphere was taking in the radiation that was missing. Finally, only one known molecule, ozone, could fit the spectrum of the missing radiation. [2]. G. M. B. Dobson a British meteorologist thoroughly investigated its characteristics and

created a straightforward spectrophotometer for the measurement of stratospheric ozone from the ground. Dobson built an international network of ozone monitoring stations between 1928 and 1958, and these stations are still in use today. In his honour, the "Dobson unit," a practical unit for measuring the amount of ozone in the atmosphere, was created.

The Sun's medium-frequency UV light, which has a wavelength between 200 and 315 nm, is absorbed by the ozone layer between 97 and 99 percent. Without it, unprotected life forms close to the surface could be harmed [3]. In 1976, atmospheric research showed that chemicals emitted by industry, primarily chlorofluorocarbons, were thinning the ozone layer (CFCs). Bans on the chemicals were enacted in response to worries that increased UV radiation brought on by ozone depletion posed a threat to life on Earth, including an increase in skin cancer in humans and other ecological issues[4]. The most recent data indicates that ozone depletion has slowed or stopped. To prevent the Ozone Layer an International Day as established by the UN General Assembly on September 16.

At a height of 100 kilometres above the surface of Venus, there is a very thin ozone layer as well. [5]

CHEMICALS RESPONSIBLE FOR OZONE LAYER DEPLETION

Man-made chemicals known as ozone depleting compounds deplete ozone, once they enter the ozone layer. The quantity of dangerous ultraviolet radiation that the sun's rays emit toward Earth is decreased by the ozone layer, which is located in the upper atmosphere. Both people and the environment can be harmed by ultraviolet radiation. As an illustration, causing cataracts and skin cancer , altering plant growth, and destroying the marine life. They have been used as:

- refrigerants (commercial, home and vehicle, air conditioners and refrigerators)
- foam blowing agents
- electrical equipment component
- solvents
- solvents for cleaning
- aerosol spray propellants
- fumigants.

Ozone depleting substances include:

- Chlorofluorocarbons (CFCs) Before it was established that CFCs were the primary cause of damage to the ozone layer in the 1980s, they were widely employed as refrigerants. They are also regarded as climate change-causing greenhouse gases. Chemicals with carbon, chlorine, and fluorine atoms are known as chlorofluorocarbons (CFCs), and they are neither poisonous nor combustible. They are employed as solvents, refrigerants, blowing agents for foams and packing materials, and aerosol sprays. .

- **Hydrochlorofluorocarbons (HCFCs):** .
  As an alternative to CFCs, hydrochlorofluorocarbons (HCFCs) have been employed. Compared to CFCs, they lessen the harm to the ozone layer.
- **Hydrobromoflurocarbons (HBFCs)**: Hydrobromofluorocarbons (HBFCs) are composed of molecules containing one, two or three carbon atoms and at least one atom each of hydrogen, bromine and fluorine. Hydrobromofluorocarbons are classified as ozone-depleting compounds due to their ozone-depleting potential (ODP).
- **Halons:** Gases called halons were initially created for use in fire extinguishers. Halons were no longer produced or consumed in industrialised nations, including New Zealand, as of 1994. Holons made before 1994 and recycled holons are the main sources of supply in New Zealand. The Fire Protection Association of New Zealand started a programme to dispose of halon responsibly.

- **Methyl Bromide:** Methyl bromide is hazardous to people and depletes the ozone layer. Application of Methyl bromide is approved for quarantine and pre-shipment purposes in New Zealand.

- **Carbon tetrachloride:**. As an organic compound with the chemical formula CCl4, carbon tetrachloride is also referred to by many other names, including tetrachloromethane, which is also recognised by the IUPAC, carbon tet in the cleaning business, Halon-104 in firefighting, and Refrigerant-10 in HVACR. It is a colourless liquid with a just perceptible "sweet" fragrance. At lower temperatures, it almost

becomes inflammable. Due to environmental and safety issues, it has now been phased out of use in cleaning agents, fire extinguishers, and as a precursor to refrigerants. High levels of carbon tetrachloride exposure, including its vapour form, can damage the liver and kidneys as well as the central nervous system. Long-term exposure can be deadly. Additionally, carbon tetrachloride damages the ozone layer. [7] and a greenhouse gas.[8]

- **Methyl chloroform:** A chloroalkane is the chemical molecule 1,1,1-trichloroethane, sometimes referred to as methyl chloroform. This sweet-smelling, colourless liquid used to be mass-produced in industries as a solvent. Its use is being quickly phased down and is governed as an ozone depleting chemical under the Montreal Protocol.

CONSEQUENCES The amount of ultraviolet light that reaches the earth's surface rises as a result of ozone layer loss. In addition to causing non-melanoma skin cancer, ultraviolet radiation has also been related to cataract development, or clouding of the lens of the eye. Crabs, fish, amphibians, and other marine species' early stages of development are harmed by UV light.

Refrences:

1. *"Ozone Basics". NOAA. 2008-03-20. Archived from the original on 2017-11-21. Retrieved 2007-01-29*
2. *.^ McElroy, C.T.; Fogal, P.F. (2008). "Ozone: From discovery to protection". Atmosphere-Ocean. **46**: 1–13. doi:10.3137/ao.460101. S2CID 128994884.*
3. *^ "Ozone layer". Retrieved 2007-09-23.*
4. ^ An Interview with Lee Thomas, EPA's 6th Administrator. Video, Transcript (see p13). April 19, 2012.
5. *^ SPACE.com staff (October 11, 2011). "Scientists discover Ozone Layer on Venus". SPACE.com. Purch. Retrieved October 3, 2015.*
6. **https://en.wikipedia.org/wiki/Ozone_layer**
7. *Fraser P. (1997). "Chemistry of stratospheric ozone and ozone depletion". Australian Meteorological Magazine. **46** (3): 185–193.*
8. *^ Evans W. F. J., Puckrin E. (1996). "A measurement of the greenhouse radiation associated with carbon tetrachloride (CCl_4)". Geophysical Research Letters. **23** (14): 1769–72. Bibcode:1996GeoRL..23.1769E. doi:10.1029/96GL01258.*
9. https://en.wikipedia.org/wiki/Carbon_tetrachloride#cite_ref-19
10. https://en.wikipedia.org/wiki/1,1,1-Trichloroethane