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An Interpretation of Natural Healing of Ozone Holes

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Abstract:

In the early days there was no Ozone in the atmosphere of earth. The ozone was formed by the action of sun's ultraviolet radiation on oxygen molecules. The oxygen (O₂) molecules absorbed energy from the Sun's ultraviolet (UV) rays and split to form single oxygen atoms. These atoms combined with molecular oxygen (O₂) to form ozone (O₃) molecules, which are very effective at absorbing UV rays. It protects living beings and plants from the earth. Ozone Layer is a deep layer in the stratosphere, encircling the Earth that has large amounts of ozone in it. Ozone depletion refers to the thinning of the ozone layer, which allows more UV radiation to reach the Earth's surface. The cause of the ozone holes is generally agreed to be CFC (chlorofluorocarbon) compounds which break down due to ultraviolet light and become free radicals containing chlorine high in the Earth's atmosphere. The area of 50-75% depletion of total ozone has been labeled as the "Ozone Hole".

The scientists observed that ozone depletion was reduced, after the ban on CHLOROFLUOROCARBON worldwide, but they were clueless about how the ozone holes that existed in the stratosphere were being filled up. The main objective of the research project was the Theory of Natural Healing of Ozone Holes.

Key words: Chlorofluorocarbon, Ultraviolet rays, Water in Atmosphere, Oxygen

1. Introduction

In the last two decades, there have been numerous reports of ozone loss in the upper atmosphere. Often the newspaper headlines and sound bites are too short to provide a complete picture; however, ozone depletion is a monumental globe problem.

Ozone is a gas made up of three oxygen atoms (O₃). Ozone Layer of atmosphere protects life on Earth from the Sun's ultraviolet (UV) radiation. Ozone is constantly being formed in the earth's atmosphere (the stratosphere) by the action of the sun's ultraviolet radiation on oxygen molecules. Ultraviolet light split the molecules apart by breaking the bonds between the atoms. A highly reactive free oxygen atom then collides with another oxygen molecule to form an ozone molecule. Because ozone is unstable, ultraviolet light quickly breaks it up, and the process begins again. UV light is found in sunlight and is emitted by electric arcs and specialized lights such as mercury lamps and black lights. It can cause chemical reactions, and causes many substances to glow or fluoresce. Ozone Layer is a deep layer in the stratosphere, encircling the Earth that has large amounts of ozone in it. The layer shields the entire Earth from much of the harmful ultraviolet radiation that comes from the sun. Ozone depletion refers to the thinning of the ozone layer, which allows more UV radiation to reach the Earth's surface. The area of 50-75% depletion of total ozone has been labelled as the "Ozone Hole". The ozone hole has steadily grown in size (up to 27 million sq.km) & length of existence over the past two decades.

The cause of the ozone holes is generally agreed to be CFC (chlorofluorocarbon) compounds which break down due to ultraviolet light and become free radicals containing chlorine high in the Earth's atmosphere

2. Statement of the Problem

Revealing the reasons behind the natural healing phenomenon of ozone holes

3. Objectives

The scientists observed that ozone depletion was reduced, after the ban on CHLOROFLUOROCARBON worldwide, but they were clueless about how the ozone holes that existed in the stratosphere were being filled up. The main objective of the research project was the Theory of Natural Healing of Ozone Holes. The research evolved from initial assumptions which are supported by many researchers in the environmental and chemistry fields.

4. Theory of Natural Healing of Ozone Holes

In the early days there was no Ozone Layer in the atmosphere of earth. The ozone was formed by the action of sun's ultraviolet radiation on oxygen molecules. The oxygen (O₂) molecules absorbed energy from the Sun's ultraviolet (UV) rays and split to form single oxygen atoms. These atoms combined with molecular oxygen (O₂) to form ozone (O₃) molecules, which are very effective at absorbing UV rays. It protects living beings and plants from the earth. In Figure 3 shows how ozone is formed and Figure 4 shows ozone is destroyed by CFC

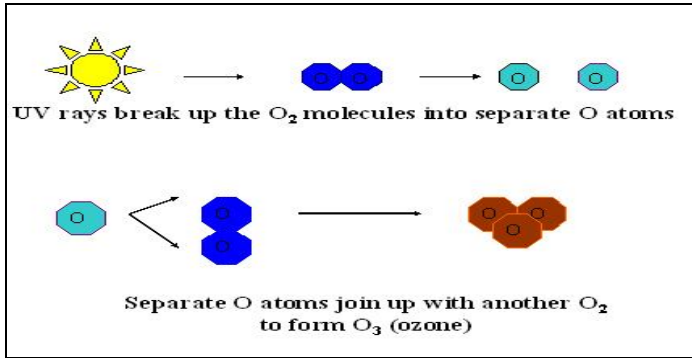


Figure 1: Formation Of Ozone

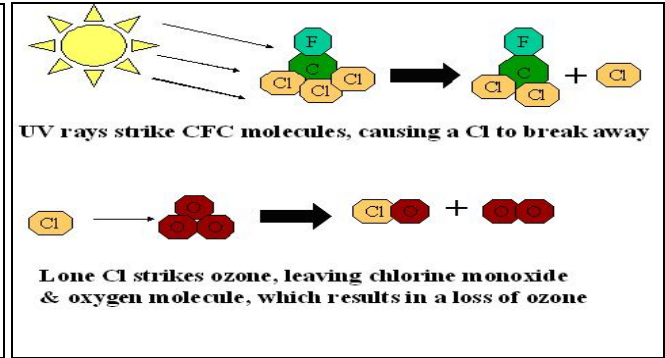
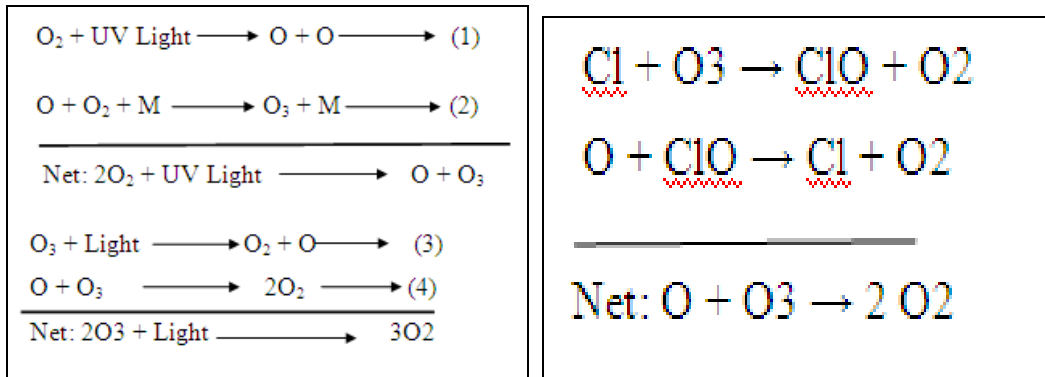


Figure 2 : CFC Destroys Ozone

It is estimated that one chlorine atom can destroy over 100,000 ozone molecules before finally being removed from the stratosphere.

4.1. Ozone Chemistry

The ozone is produced by the photolysis of oxygen molecules into oxygen atoms.



The theory of Natural filling of ozone holes is classified as three stages

- Effects of UV rays with water in the Earth Atmosphere
- Effects of UV rays with water in the Earth
- An unobserved Role of trees for producing Ozone

4.2. Effects of UV Rays with Water in the Earth Atmosphere

Heat from the Sun causes water to evaporate from the surface of lakes and oceans. This turns the liquid water into water vapor in the atmosphere. The percentage of water vapor in surface air varies from .01% at -42°C (-44°F)^[13] to 4.24% when the dew point is 30°C (86°F). Approximately 99.13% of it is contained in the troposphere. At any time it is estimated that the earth has about 3100 cubic miles of water in air

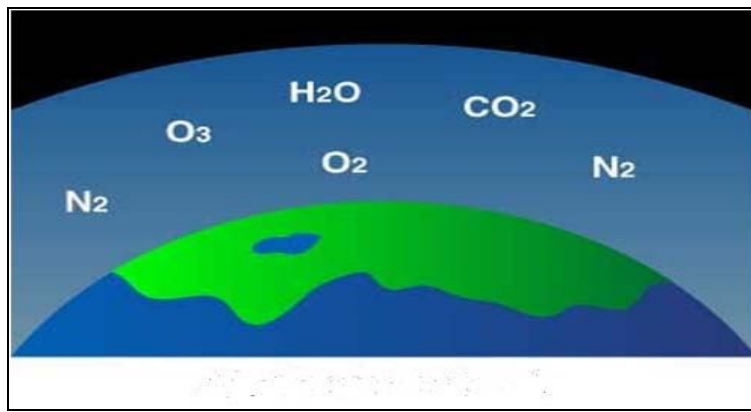


Figure 3: Water in the Earth Atmosphere

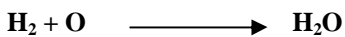
As per the theory of Natural Healing of ozone holes, the ozone holes create the passage for more infiltration of Ultraviolet rays into earth's atmosphere. The quantum of Ultraviolet rays interact with the number of water molecules in the air, since it is in a scattered form the reaction will be very very higher than the case of liquid water. So that naturally these reactions will also high the production of oxygen and gradually it will convert into ozone.

4.2.1. Chemical Reaction of UV Rays With Water

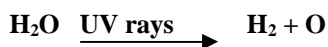
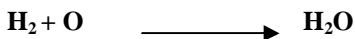
Photo catalytic water splitting is a general term used for the dissociation of water into its constituent parts, hydrogen (H₂) and oxygen (O₂), using either artificial or natural light.



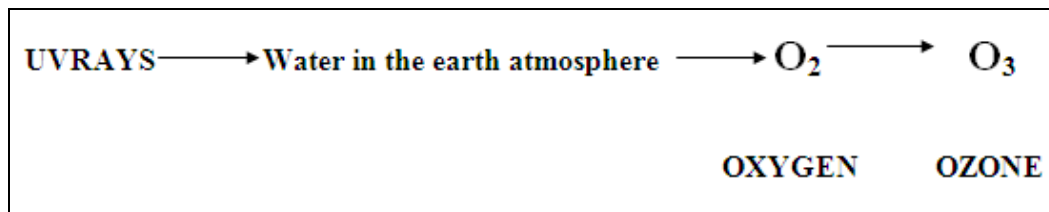
Some form of energy is required to split water into hydrogen and oxygen. It could either be through electrolysis or any other disinfectants such as chlorine or ozone even ultraviolet rays can play a vital role in this process



UV rays got the capacity to split H₂O into H₂ and O



As shown in the figure 3 we know that Ozone are formed by ultraviolet rays and figure 4 shows how the ozone hole is created



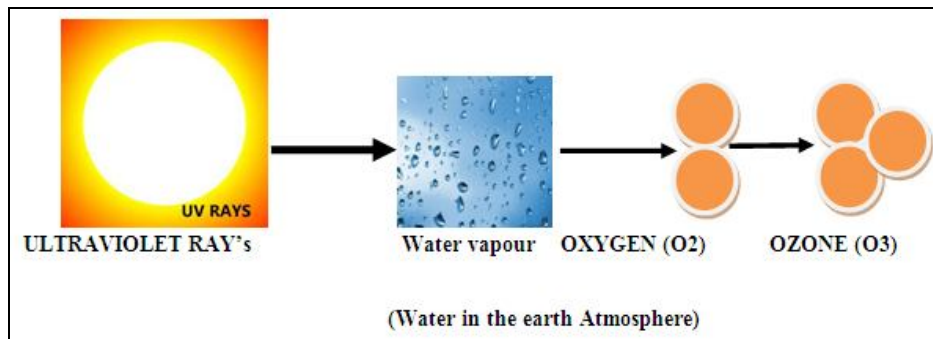


Figure 4: Effect of UV Rays with Water in the Earth Atmosphere

4.3. Effects of UV Rays with Water in the Earth

Water covers 71% of the Earth's surface, and is vital for all known forms of life. On Earth, 96.5% of the planet's water is found in seas and oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapor, clouds (formed of solid and liquid water particles suspended in air), and precipitation. Only 2.5% of the Earth's water is fresh water, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products. As per the theory of Natural Healing of ozone holes, the ozone holes create the passage for more infiltration of Ultraviolet rays into earth and more than 71% of the earth is covered by water naturally the UV rays will fall on the water(H₂O) and water will start to split into hydrogen (H₂) and Oxygen (O₂). This process will help to increase the oxygen production and gradually it will convert into ozone.

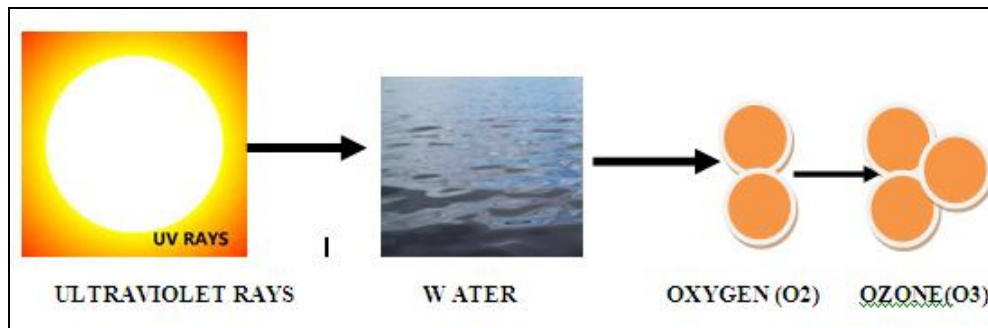
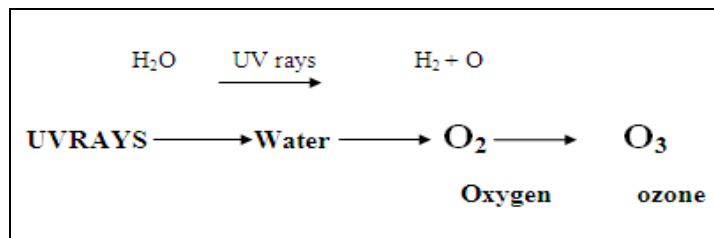


Figure 5: Effect of UV Rays with Water in the Earth

4.4. An Unobserved Role Of Trees For Producing Ozone

Apart from photosynthesis, trees play a vital role for producing ozone. Forest covers approximately 9.4 percent of the Earth's surface. Trees contribute 10% of the total moisture of the atmosphere. The 75% percent of rainfall water from trees gets back to the atmosphere and the remaining 25% infiltrates the soil. This eventually reaches the streams. As trees suck water from the soil and evaporates the 75% of water it into the atmosphere, it results into increase in the water percentage of the atmosphere. As the water percentage in the atmosphere increases, the Ultraviolet rays react with number of water molecules in the earth's and leads to higher production of oxygen and this gradually gets converted into ozone

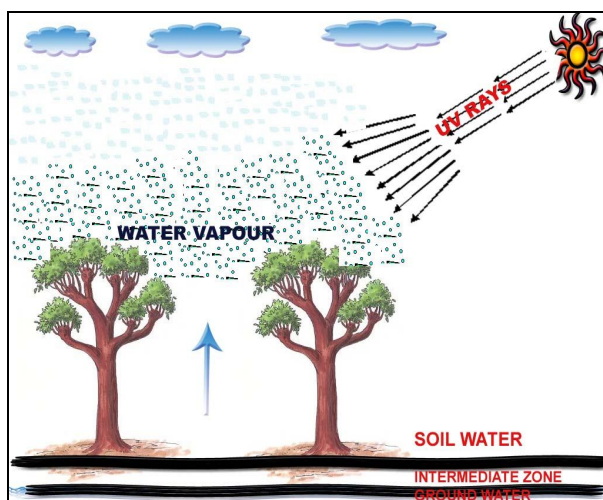


Figure 6: An Unobserved Role of Trees for Producing Ozone

5. Why Was Ozone Hole Formed In Antarctica And How Our Theory Work On These Process

Chlorofluorocarbon gases (CFCs) take six or seven years to move up to the stratosphere and the winds spread them all round the world. Extreme cold, a freezing vortex wind, frozen stratospheric clouds and 6-month darkness over Antarctica all provide ideal conditions for chlorine to break from the CFCs. The chlorine gases destroy the ozone during spring (Sept to Dec) and this is what causes the ozone hole. The hole in Antarctica occurs in the spring (September to December). It begins with this overall ozone thinning, but it is assisted by the presence of polar stratospheric clouds (PS clouds). During the extreme cold of winter, with no sun for six months, polar winds create a vortex which traps and chills the air; the temperature is below -80 Celsius. The ice in these PS clouds provides surfaces for the chemical reactions that destroy the ozone. This needs light to kick-start the reactions. In spring the sun rises above the horizon and provides energy which starts the photochemical reactions. The clouds melt and the trapped compounds (chlorine and chlorine monoxide from the CFCs) are released. Ozone in the lower stratosphere is destroyed and it destroys the PS clouds. As per the theory of Natural Healing of ozone holes, the ozone holes create the passage for more infiltration of Ultraviolet rays into earth atmosphere. The quantum of Ultraviolet rays interact with more number of water molecules in the air, since it is in a scattered form the reaction will be very much higher than the case of liquid water. So that naturally these reactions will also high the production of oxygen and gradually it will convert into ozone.

6. Conclusion

There is no doubt that the problem of Ozone Hole exists and the effects of ozone depletion are real and of great global significance. Ozone hole causes an increase in UV radiation reaching the earth's surface harming plant, animal, and marine life. It is only in the last few years that banning the use of CFCs are becoming apparent. We don't need to be panic as per the theory of Natural Healing of Ozone holes we have explained briefly how the ozone holes that existed in the stratosphere were being filled up. Conservation of forest and restricting cutting of trees also help for producing ozone. If each human in this world would be willing to make a small sacrifice for the greater good, the future of our ozone layer would undoubtedly be secure.

7. Glossary

- Chlorofluorocarbons (CFCs)—anthropogenic, carbon-based compounds containing chlorine and fluorine that are used as refrigerants, blowing agents, and cleaning solvents. Their production is now being limited because the chlorine from these molecules eventually destroys stratospheric ozone.
- Chlorine activation—a process where inert chlorine reservoir molecules, ClONO_2 and HCl , are converted into active chlorine radicals, Cl and ClO , that can destroy ozone in a Catalytic cycle.
- Polar stratospheric clouds (PSCs)—clouds formed in the stratosphere during the cold polar winter. Heterogeneous reactions of chlorine compounds on the surfaces of these Clouds play an important role in ozone destruction.
- Stratosphere—the part of the upper atmosphere where the ozone layer exists. In the stratosphere, the temperature increases with increasing altitude.
- Troposphere—the part of the atmosphere closest to Earth. We breathe the air in the troposphere, and weather is controlled by tropospheric air motions.
- Ultraviolet (UV) radiation—high energy light with wavelengths between 200 and 400nm.
- Ozone---- Ozone is a gas made up of three oxygen atoms (O_3). Ozone Layer of atmosphere protects life on Earth from the Sun's ultraviolet (UV) radiation.

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