

Ozone Layer Depletion And Efficacy Of Microorganisms On It

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Abstract: Across these last decades, there are many circumstances where human activities have been affecting in different aspects of the environment. In this modern era emission of greenhouse gases and the practice of fossil fuel become a catastrophic global matter, which leads humankind toward an unruly environment. One is the degradation of the ozone layer. The ozone layer is key as it plays a vital role in the life of all living creatures on the planet, certain elements make the earth habitable for living creatures, one of them being the presence of the ozone layer. Life on earth is possible because of the ozone layer that covers the earth. This article is therefore aimed at revising the sources, causes, and bio effects of ozone layer depletion as well as the role of some microbes that fight greenhouse gas denitrifies. The chlorofluorocarbon and the halons are vigorous ozone depleters. The ozone layer is very distinctive because it prevents too many damaging ultraviolet radiations from radiating and attaining earth. Ultraviolet rays have such a wrecking impact on the earth and have this susceptibility to perish animals and plants and human health and major impacts on global warming and climate-changing. Although, the prospective of ozone layer restoration subsist, unexplored. In the absence of other alterations, stratospheric ozone redundancies should ascent in the future as then halogen loading pests in response to the adjustment. However, the future compartment of ozone will as well as be linked and effected through the alteration atmospheric redundancies of methane, water vapor, sulfate aerosol, nitrous oxide, and climate-changing.

Keywords: Bio effects, chlorofluorocarbon, Ozone Layer Depletion, Protection, denitrifies.

1. INTRODUCTION:

Ozone Layer is the Earth's stratospherical layer which is present between 15 and 35 kilometers up in the atmospheric region. It is indisputable that without the presence of ozone, life on the earth, would not have flourished in such a way that is going on nowadays[1]. The ozone layer is a layer in earth atmosphere that possesses a high concentration of (O₃), this layer plays an indispensable role in covering and protecting the earth from harmful ultraviolet rays[2]. This layer approximately could absorb 93-99% of the sunlight frequency which is containing ultraviolet light[3]. The thickness of the ozone layer is relatively varied seasonally and geographically in different circumstances. Chiefly, over 90% of ozone is located in the lower portion of the stratosphere from approximately 10-57 km above the earth and is called ozone layer[4]. The ozone molecule is formed from an oxygen molecule through striking UV radiation on the O₂ molecules in the stratospheric region that it causes splitting of O₂. Oxygen

molecules react with an oxygen atom in the upper atmosphere to form ozone consequently, this process of ozone production is called photolysis[3]. There are some discrepancies between an ozone molecule and (O_2), O_2 is constituted of 2 molecules of oxygen and when we inhale it is odorless and colorless too. Ozone, on the other hand, consists of 3 atoms of oxygen bound together (O_3), ozone is colorless the same as O_2 but has a pungent fragrance[5]. Unlike O_2 ozone is much less common. Out of 10 million air molecules, around 2 million are oxygen but only 3 are ozone this ratio indicates that ozone is rare in nature. The adequate concentration of the ozone layer in the stratospheric region blocks noxious solar irradiance[6]. All life on earth has attuned to this filtrated solar radiation.

History:

The ozone layer was first discovered by the French physicists Charles Fabry and Henri Buisson in 1913[3]. The properties of ozone layer was studied further by the British meteorologist G.M.B. Dobson. He discovered the simple spectrophotometer which is an instrument which can measure the stratospheric ozone from the ground.[7]. Between 1928 and 1958 Dobson established a worldwide network of ozone monitoring stations that continues to operate today. In honorary to his name, the "Dobson unit" was evolved, a convenient measure of the total amount of ozone in a column overhead. The normal concentration of ozone is about 300 to 350[3].

Ozone hole

The term ozone hole is more known and reputed in newspapers, magazines as great as several books. This term is still employed and more often quoted. Indeed, this term is frequently used to demonstrate any occurrence of ozone layer depletion [8] [12]. In 1970 ozone holes were first found in Antarctica. Ozone holes in the arctic region are also found a few years ago. The rate of ozone depletion has risen by 0.5 per cent per year since 2000 [4][9]. Since ozone UV rays are reduced, they enter the troposphere and induce further ozone formation in the troposphere, which has deleterious effects on our health because ozone is toxic.

Cause of ozone layer depletion in the environment:

Admittedly, ozone layer depletion occurs when the natural balance between production and destruction of stratospheric ozone is disturbed. Though, some natural phenomena can cause provisional ozone tine. Ozone layer depletion disquieted the scientists when the CFC_s were suggested by Drs. Molina and Rowland in 1974 that a man-made group of compounds accepted as the main cause of this depletion[10].

1.2 chlorofluorocarbons:

The chlorofluorocarbons or (CFC_s) which are also known as (Freon) are non-flammable, non-toxic and non-carcinogenic. They composed of chlorine atoms, fluorine atoms, and carbon atoms[11]. For the first time, the Montreal Protocol was devised to protect the stratospheric ozone layer by authorizing a reduction in the amplitude of ozone-depleting substances such as CFC_s in the atmosphere[4]. The emission of CFC_s can cause many harmful and irreparable upon ozone in the stratospheric layer, the presence of chlorine within CFC_s smash the ozone gases in the ozone layer which enhances the alterations of ozone layer depletion, according to data, CFC_s have accounted for about 80% of ozone layer depletion[12].

Unregulated Rocket Launches:

Nowadays, the world is continually evolving and human curiosity leads human beings toward more and explorations beyond our planet, accordingly, in these last decades scientists have done many remarkable detections through launching rockets on other planets. These

explorations will necessitate us dearly, this topic is another main cause of large-scale ozone depletion. It has been detected that unregulated rocket lunches cause much more ozone depletion than CFCs. scientists estimated that by the year 2050 a huge ozone loss will be appeared by unregulated rocket lunches and it would be much more than CFC's impacts on earth[4][3].

Global Warming

Currently, global warming is a controversial topic among most of the countries. Mostly the animals and humans are suffering from this devastating phenomenon, this factor undeviatingly has efficacy on the environment[13]. Global warming also leads the earth to ozone layer depletion. Due to global warming and the greenhouse gas effect, most of the heat is trapped in the troposphere which is the layer located below the stratosphere[14]. As we all know ozone is present in the stratosphere so heat does not reach the troposphere and it remains cold as the recovery of the ozone layer requires maximum sunlight and heat so it leads to depletion of the ozone layer[15].

Nitrogenous compounds

Nitrogen compounds released by human activities in small amounts such as NO, N₂O and NO₂ are known to be heavily responsible for degradation of the ozone layer. Future ozone evolution will rely on stratospheric ozone layer anthropogenic emissions of nitrogen oxide (NO₂), carbon dioxide (CO₂), methane (CH₄), and halocarbons [16].

Efficacies of ozone depletion:

Ozone depletion often impacts the atmosphere adversely because it enables the absorption of UV radiation to enter the surface of the Earth. Such radiations can cause severe human illnesses such as; eye damage, skin cancer, genetic mutation, etc. [17]. The loss of ozone also damages aquatic life, air quality and biogeochemical process. If we think about the impact of ozone on human health then we know that we need more research to explain ozone layer depletion wrecking efficiencies. For example, cataracts are the major cause of blindness in this world (there would be 0.3 percent-0.6 percent increase in cataract risk if ozone level decreases by 1 percent), as well as the disposal of UV radiation can cause skin cancer and various diseases. Other problems such as: human immunity, lung disease, DNA destruction, human health effects of hydrogen peroxide and the impacts of food shortage on the human population will appear due to depletion of the ozone layer [18].

Efficacy of microorganisms on the environment:

Microorganisms are the most common living creatures on our planet and have a positive or negative impact on our climate and maintain ecological balance [19]. As discussed in previous articles, the major greenhouse gasses are carbon dioxide, methane and nitrous oxide, which are detrimental to our atmosphere and have an enormous impact on the ozone layer and the global environment. Microbes play a significant role either as generators or as consumers of those gases. Microbes in the environment can recycle and demise the essential elements such as carbon and nitrogen that consolidate cells [21].

Denitrifying microorganism:

One of the constituents of greenhouse gases is a nitrous oxide that is about 300 times brawnier and exposes the ozone layer each time it is released into the atmosphere by farming practices, silage treatments and fossil fuel ignition [22]. Fortunately, the world has an occasional solution for battling greenhouse gases [23]. Discoveries made by scientists can help us conserve the earth. One of those microbes is denitrifies that have this ability to

transform the dangerous nitrous oxide into harmless nitrogen gas, respectively. Such microbes use an enzyme known as (NosZ) that catalysis the reaction. Nevertheless, researchers have recently discovered that this vulnerability often occurs in several other classes of microorganisms that all use nitrous oxide and potentially reduce emissions. [24] Prochlorococcus and Synechococcus are cyanobacteria with single cells. Both are the smallest yet most abundant photosynthetic microbes in the ocean, researchers estimated that each year these two microbes remove around 10 billion tons of carbon from the air which indicates the role of microorganisms on our planet [4].

Methyl korusinferno rum bacterium:

There is another finding involving a new bacterium that can solve the global warming gas crisis. It is claimed that the detected bacterium Methyl korusinferno rum absorbs the methane gas. This bacterium's natural habitat is the geothermal area of Hells Gate, Rotorua, 30 cm below ground surface. This bacterium refers to living in an acidic and hot climate. Recognizing this microorganism. This microorganism is recognized as "Methanotrophic bacteria" which can consume as their only source of energy and convert it to carbon dioxide during their digestive process[25]. This bacteria can consume a massive quantity of methane approximately 11 kg per year[26]. It is estimated that around 20% of global methane is produced is from ruminants[28]. Researchers in Australia have developed a vaccine that can be given to animals. This vaccine acts by preventing the microbes in the rumen from producing methane[29]. This vaccine is only effective against 20% of the microbial species that produce methane[30]. Meanwhile another species community has this ability to digest cellulose into grass, hay, and grains. A group of archaea living in the rumen of a ruminant, specializing in breaking down food of the animal into methane gas [27]. The ruminant then belches this gas out of both ends of its digestive system, warming the earth up to 20 times more than CO₂. The estimated output of around 20 percent of global methane is from ruminants [28]. Australian researchers have created a vaccine that can be given to the animals. This vaccine works by stopping methane production by the microbes in the rumen [29]. This vaccine is successful only against 20 per cent of methane-producing microbial species [30].

2. CONCLUSION:

As we all know that global warming and ozone layer depletion are linked through some environmental phenomena, due to either increase or decrease of concentration of some gases in the atmosphere. Fossil fuels, landfills, CFC_s and Rocket lunches, etc are the factors which directly effect on the ozone layer and global warming that may lead our planet toward catastrophic disaster and have unfavorable consequences in our life. Detrimental efficacies of these factors are the only reason that nowadays most of the countries are trying to reduce and curb the rate of carbonic emissions. Although due to complications of microbial communities and attachments with their surrounding makes it complicated to precisely identify the various feedback rejoinders that microorganisms may have to global warming and ozone layer depletion. Nevertheless, regarding this controversial dilemma, many discoveries have done yet and it's in progress day to day, specifically about the role of microorganisms that have capabilities to harness the emissions and production of harmful substances and gases.

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