ISSN 2350-1030

International Journal of Recent Research in Physics and Chemical Sciences (IJRRPCS)
Vol. 3, Issue 1, pp: (17-26), Month: April 2016 – September 2016, Available at: www.paperpublications.org

Ozone Layer: The Shield in the Sky

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Abstract: **There are many situations where human activitieshave significant effects on the environment. Ozone layerdamage is one of them. The objective of this paper is to reviewthe origin, causes, mechanisms and bio effects of ozone layerdepletion as well as the protective measures of this vanishing layer. The chlorofluorocarbon and the halons are potent ozonedepletors. One of the main reasons for the widespread concernabout depletion of the ozone layer is the anticipated increase inthe amounts of ultraviolet radiation received at the surface ofthe earth and the effect of this on human health and on the environment. The prospects of ozone recovery remain uncertain.In the absence of other changes, stratospheric ozoneabundances should rise in the future as the halogen loading fallsin response to regulation. However, the future behaviour ofozone will also be affected by the changing atmospheric abundances of methane, nitrous oxide, water vapour, sulphateaerosol, and changing climate.**

Keywords: **Ozone, Ozone Depletion, Chloroflourocarbons (CFCs), Ultra Violet (UV) Radiations, Bio-Effects.**

1. INTRODUCTION

All life on Earth depends on the existence of a thin shield of a poisonous gas high in the atmosphere: the ozone layer. Ozone is a molecule made up of made up of three oxygen atoms. It is an extremely rare component of the Earth's atmosphere; in every ten million molecules of air, only about three are ozone. Most of the ozone (90%) is found in the upper atmosphere (the stratosphere), between 10 and 50 kilometers (6–30 miles) above the Earth's surface. This 'ozone layer' absorbs all but a small fraction of the harmful ultraviolet radiation (UV-B) emanating from the sun. It therefore shields plant and animal life from UV-B, which in high doses can be particularly damaging. The ozone layer is a layer in Earth's atmosphere which contains relatively high concentrations of ozone (O3). This layer absorbs 93-99% of the sun's high frequency ultraviolet light, which is potentially damaging to life on earth. Over 91% of the ozone in Earth's atmosphere is present here.It is mainly located in the lower portion of the stratosphere from approximately 10 km to 50 km above Earth, though the thickness varies seasonally and geographically.The ozone layer was discovered in 1913 by the French physicists Charles Fabry and Henri Buisson. Its properties were explored in detail by the British meteorologist G. M. B. Dobson, who developed a simple spectrophotometer (the Dobson meter) that could be used to measure stratospheric ozone from the ground. Between 1928 and 1958 Dobson established a worldwide network of ozone monitoring stations which continues to operate today. The "Dobson unit", a convenient measure of the total amount of ozone in a column overhead, is named in his honor.

2. OZONE

Without ozone, life on Earth would not have evolved in the way it has. The first stage of single cell organism development requires an oxygen-free environment. This type of environment existed on earth over 3000 million years ago. As the primitive forms of plant life multiplied and evolved, they began to release minute amounts of oxygen through the photosynthesis reaction (which converts carbon dioxide into oxygen). The buildup of oxygen in the atmosphere led to the formation of the ozone layer in the upper atmosphere or stratosphere. This layer filters out incoming radiation in the"cell-damaging" ultraviolet (UV) part of the spectrum. Thus with the development of the ozone layer came the formation of more advanced life forms. Ozone is a form of oxygen. The oxygen we breathe is in the form of oxygen molecules (O2) - two atoms of oxygen bound together. Normal oxygen which we breathe is colourless and odourless. Ozone, on the other hand, consists of three atoms of oxygen bound together (O3). Most of the atmosphere's ozone occurs in the region called the stratosphere. Ozone is colourless and has a very harsh odour. Ozone is much less common than normal oxygen. Out of 10 million air molecules, about 2 million are normal oxygen, but only 3 are ozone. Most ozone is produced naturally in the upper atmosphere or stratosphere. While ozone can be found through the entire atmosphere, the greatest concentration occurs at altitudes between 19 and 30 km above the Earth's surface. This band of ozone-rich air is known as the "ozone layer". [4] Ozone also occurs in very small amounts in the lowest few kilometres of the atmosphere, a region known as the troposphere. It is produced at ground level through a reaction between sunlight and volatile organic compounds (VOCs) and nitrogen oxides (NOx), some of some of which are produced by human activities such as driving cars. Ground-level ozone is a component of urban smog and can be harmful to human health. Even though both types of ozone contain the same molecules, their presence in different parts of the atmosphere has very different consequences. Stratospheric ozone blocks harmfulsolar radiation - all life on Earth has adapted to this filtered solar radiation. Ground-level ozone, in contrast, is simply a pollutant. It will absorb some incoming solar radiation but it cannot make up for ozone losses in the stratosphere.

3. OZONE HOLE

In some of the popular news media, as well as in manybooks, the term "ozone hole" has and often still is used far tooloosely. Frequently, the term is employed to describe anyepisode of ozone depletion, no matter how minor.Unfortunately, this sloppy language trivializes the problemand blurs the important scientific distinction between themassive ozone losses in Polar Regions and the much smaller,but nonetheless significant, ozone losses in other parts of theworld. Technically, the term "ozone hole" should be appliedto regions where stratospheric ozone depletion is so severethat levels fall below 200 Dobson Units (D.U.), thetraditional measure of stratospheric ozone. Normal ozoneconcentration is about 300 to 350 D.U .Such ozone lossnow occurs every springtime above Antarctica, and to alesser extent the Arctic, where special meteorologicalconditions and very low air temperatures accelerate andenhance the destruction of ozone loss by man-made ozonedepleting chemicals (ODCs)

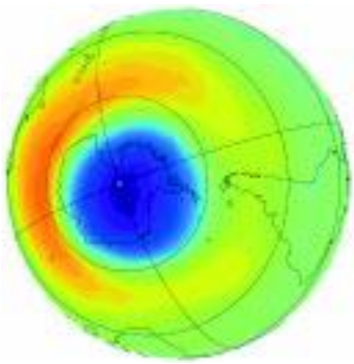

Fig.1: The Antarctic ozone hole in October 1999.

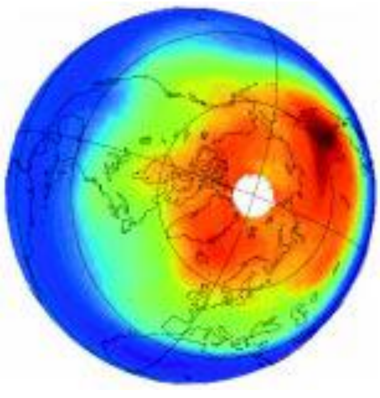

Fig.2: The monthly average total ozone in March 1999 for the Arctic (North Pole).

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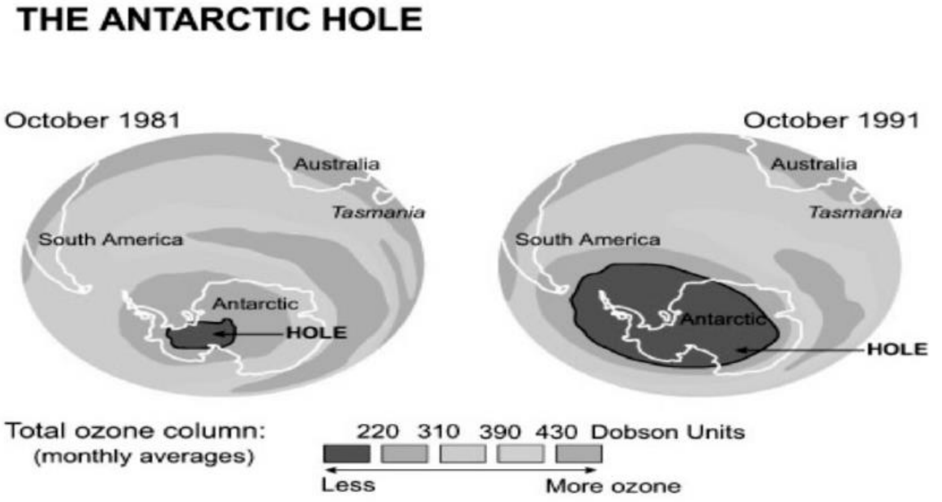

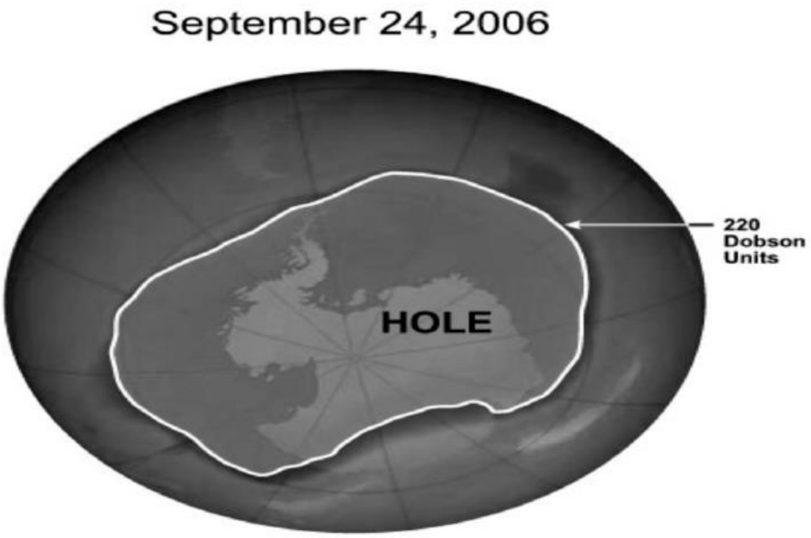

From September 21-30, 2006, the average area of the ozone hole was the largest ever observed.

4. OZONE LAYER

The ozone layer is not really a layer at all, but has becomeknown as such because most ozone particles are scattered between 19 and 30 kilometers (12 to 30 miles) up in theEarth's atmosphere, in a region called the stratosphere. The Concentration of ozone in the ozone layer is usually under 10parts ozone per million [5]. Without the ozone layer, a lot ofultraviolet (UV) radiation from the Sun would not be stoppedreaching the Earth's surface, causing untold damage to mostliving species. In the 1970s, scientists discovered thatchlorofluorocarbons (CFCs) could destroy ozone in thestratosphere. Ozone is created in the stratosphere when UVradiation from the Sun strikes molecules of oxygen (O2) andcauses the two oxygen atoms to split apart. If a freed atombumps into another O2, it joins up, forming ozone (O3). Thisprocess is known as photolysis. Ozone is also naturallybroken down in the stratosphere by sunlight and by achemical reaction with various compounds containingnitrogen, hydrogen and chlorine. These chemicals all occurnaturally in the atmosphere in very small amounts. In anunpolluted atmosphere there is a balance between the amountsof ozone being produced and the amount of ozone beingdestroyed. As a result, the total concentration of ozone in thestratosphere remains relatively constant. At differenttemperatures and pressures (i.e. varying altitudes within thestratosphere), there are different formation and destructionrates. Thus, the amount of ozone within the stratospherevaries according to altitude. Ozone concentrations are highestbetween 19 and 23 km .Most of the ozone in thestratosphere is formed over the equator where the level ofsunshine striking the Earth is greatest. It is transported bywinds towards higher latitudes. Consequently,

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the amount ofstratospheric ozone above a location on the Earth variesnaturally with latitude, season, and from day-to-day. Undernormal circumstances highest ozone values are found overthe Canadian Arctic and Siberia, whilst the lowest values arefound around the equator. The ozone layer over Canada isnormally thicker in winter and early spring, varying naturallyby about 25% between January and July. Weather conditionscan also cause considerable daily variations.

Total ozone (DU)/ Total Ozone (UD):

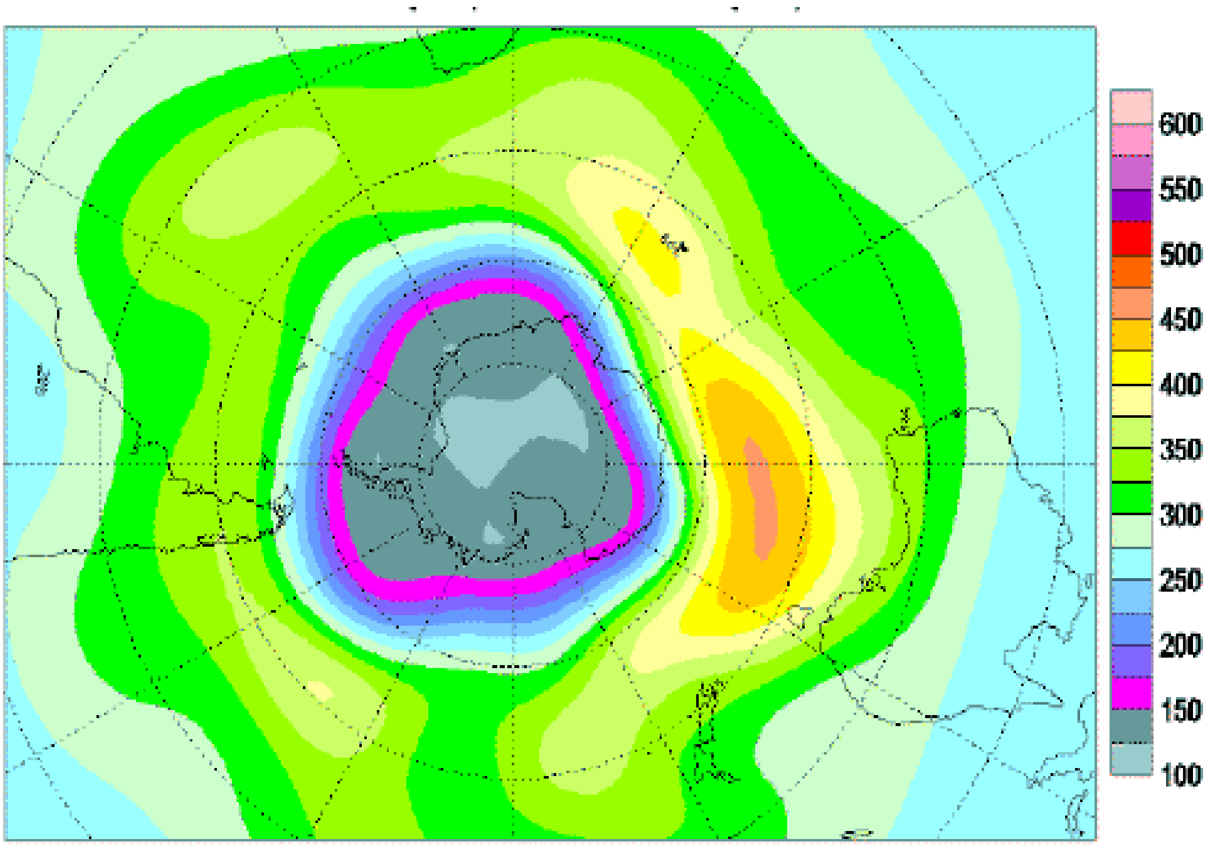

Fig.3: ozone layer depletion over Antarctica

5. OZONE DEPLETION

Any damage to the ozone layer therefore allows more UV-Bra diation to reach the surface of the Earth. Throughout the 1970s and1980s, scientists began first to suspect, and then to detect, a steadythinning of the layer. This wasac companied by increases in the amount of UV-B reaching the surface. In northern he misphere mid-latitudes (25–60°, i.e. north of the tropics but south of the polarregions), UV-B levels are now about7% higher than twenty years ago inthe winter and spring, and about 4%higher in the summer and autumn. In southern hemisphere mid-latitudes, UV-B levels are about 6%higher all the year round. UV-Bra diation has increased dramatic all ynearer the poles, particularly in thespring – 22% higher in the Arcticand 130% higher in the Antar cticrelative to values in the 1970s.

Moderate exposure to UV-B poses no dangers; indeed, in humans it is anessential part of the process that forms vitamin D in the skin. Buthigher levels of exposure havepotentially harmful effects on human health, animals, plants, microorganisms, materials and air quality. In humans, long-term exposure toUV-B is associated with the risk ofeye damage, including sever ereactions such as ‘snow blindness’, cancer and cataracts; UV-Bra diation can cause effects on theimmune system, but may be bothadverse and beneficial. Increases inUV-B are likely to accelerate the rate of photo aging, as well asincrease the incidence (andassociated mortality) of melanoma and non-melanoma skin cancer, basal cell and squamous cellcarc inoma with risk increasing withfairness of the skin. The risk of the more serious melanoma may alsoincrease with UV-B exposure, particularly during childhood; melanoma is now one of the most common cancers among white-skinnedpeople.

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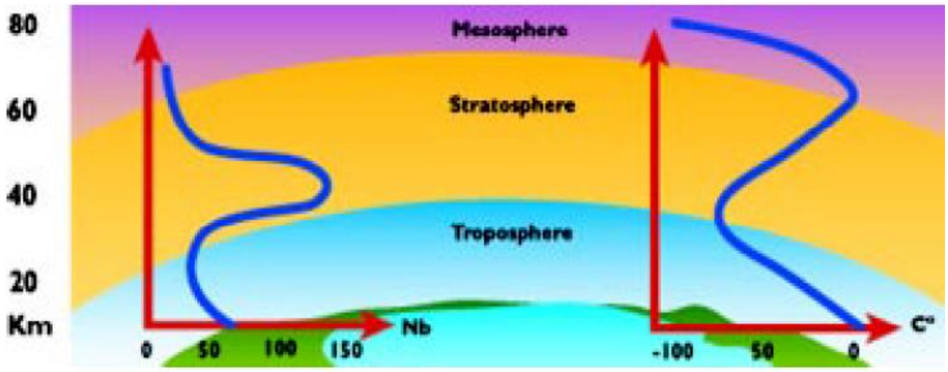

Fig.4: The thin layer of ozone in the stratophere is at its thickest between about20-40 km up.It also accumulates near the ground in the troposphere, where it is a troublesome pollutant.

6. MEASURING OZONE DEPLETION

The most common stratospheric ozone measurement unit isthe Dobson Unit (DU). The Dobson Unit is named after theatmospheric ozone pioneer G.M.B. Dobson who carried outthe earliest studies on ozone in the atmosphere from the1920s to the 1970s. A Dobson Unit measures the total amountof ozone in an overhead column of the atmosphere. DobsonUnits are measured by how thick the layer of ozone would beif it were compressed into one layer at 0 degrees Celsius andwith a pressure of one atmosphere above it. Every 0.01millimeter thickness of the layer is equal to one Dobson Unit. The average amount of ozone in the stratosphere acrossthe globe is about 300 DU (or a thickness of only 3mm at 0°Cand 1 atmospheric pressure!). Highest levels of ozone areusually found in the mid to high latitudes, in Canada andSiberia (360DU). When stratospheric ozone falls below 200DU this is considered low enough to represent the beginningsof an ozone hole. Ozone holes of course commonly formduring springtime above Antarctica, and to a lesser extent theArctic.

7. OZONE LAYER RECOVERY

The ozone depletion caused by human-produced chlorineand bromine compounds is expected to gradually disappearby about the middle of the 21st century as these compoundsare slowly removed from the stratosphere by naturalprocesses. This environmental achievement is due to thelandmark international agreement to control the productionand use of ozone-depleting substances. Full compliancewould be required to achieve this expected recovery. Withoutthe Montreal Protocol and its Amendments, continuing use ofchlorofluorocarbons (CFCs) and other ozone-depletingsubstances would have increased the stratosphericabundances of chlorine and bromine tenfold by themid-2050s compared with the 1980 amounts .Such highchlorine and bromine abundances would have caused verylarge ozone losses, which would have been far larger than thedepletion observed at present. In contrast, under the currentinternational agreements that are now reducing thehuman-caused emissions of ozone-depleting gases, the nettroposphere concentrations of chlorine- andbromine-containing compounds started to decrease in 1995.Because 3 to 6 years are required for the mixing from thetroposphere to the stratosphere, the stratospheric abundancesof chlorine are starting to reach a constant level and willslowly decline thereafter. With full compliance, theinternational agreements will eventually eliminate most ofthe emissions of the major ozone-depleting gases. All otherthings being constant, the ozone layer would be expected toreturn to a normal state during the middle of the next century.This slow recovery, as compared with the relatively rapidonset of the ozone depletion due to CFC andbromine-containing halons emissions, is related primarily tothe time required for natural processes to eliminate the CFCsand halons from the atmosphere. Most of the CFCs andhalons have atmospheric residence times of about 50 toseveral hundred years.

8. CAUSES OF OZONE DEPLETION

Ozone depletion occurs when the natural balance betweenthe production and destruction of stratospheric ozone is tipped in favour of destruction. Although natural phenomenacan cause temporary ozone loss, chlorine and bromine released suggested by Drs. M. Molina and S. Rowland in 1974 that afrom man-made compounds such as CFCs are now accepted

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as the main cause of this depletion .It was firstman-made group of compounds known as the chlorofluorocarbons (CFCs) were likely to be the mainsource of ozone depletion. However, this idea was not taken

seriously until the discovery of the ozone hole over Antarctica in 1985 by the Survey. Chlorofluorocarbons are

not "washed" back to Earth by rain or destroyed in reactions with other chemicals. They simply do not break down in thelower atmosphere and they can remain in the at mosphere from 20 to 120 years or more. As a consequence of theirrelative stability, CFCs are instead transported into the stratosphere where they are eventually broken down by

ultraviolet (UV) rays from the Sun, releasing free chlorine. The chlorine becomes actively involved in the process of

destruction of ozone. The net result is that two molecules of zone are replaced by three of molecular oxygen, leaving thechlorine free to repeat the process:

$Cl + O_3 \quad = \quad ClO + O_2$

$ClO + O \quad = \quad Cl + O_2$

Ozone is converted to oxygen, leaving the chlorine atomfree to repeat the process up to 100,000 times, resulting in a

reduced level of ozone. Bromine compounds, or halons, canalso destroy stratospheric ozone. Compounds containingchlorine and bromine from man-made compounds are knownas industrial halocarbons. Emissions of CFCs have accountedfor roughly 80% of total stratospheric ozone depletion.Thankfully, the developed world has phased out the use ofCFCs in response to international agreements to protect theozone layer. However, because CFCs remain in theatmosphere so long, the ozone layer will not fully repair itselfuntil at least the middle of the 21st century. Naturallyoccurring chlorine has the same effect on the ozone layer, buthas a shorter life span in the atmosphere.

A. Chlorofluorocarbons:

Chlorofluorocarbons or CFCs (also known as Freon) arenon-toxic, non-flammable and non-carcinogenic. They Contain fluorine atoms, carbon atoms and chlorine atoms.The 5 main CFCs include CFC-11 (trichlorofluoromethane -$CFCl_3$), CFC-12 (dichloro-difluoromethane - CF_2Cl_2),CFC-113 (trichloro- trifluoroethane - $C_2F_3Cl_3$), CFC-114 (dichloro-tetrfluoroethane - $C_2F_4Cl_2$), and CFC-115 (chloro pentafluoroethane - C_2F_5Cl).CFCs are widely used ascoolants in refrigeration and air conditioners, as solvents incleaners, particularly for electronic circuit boards, as ablowing agents in the production of foam (for example fireextinguishers), and as propellants in aerosols. Indeed, muchof the modern lifestyle of the second half of the 20th centuryhad been made possible by the use of CFCs.Man-made CFCshowever, are the main cause of stratospheric ozone depletion.CFCs have a lifetime in the atmosphere of about 20 to100 years, and consequently one free chlorine atom from aCFC molecule can do a lot of damage, destroying ozonemolecules for a long time. Although emissions of CFCsaround the developed world have largely ceased due tointernational control agreements, the damage to the. Stratospheric ozone layer will continue well into the 21stcentury.

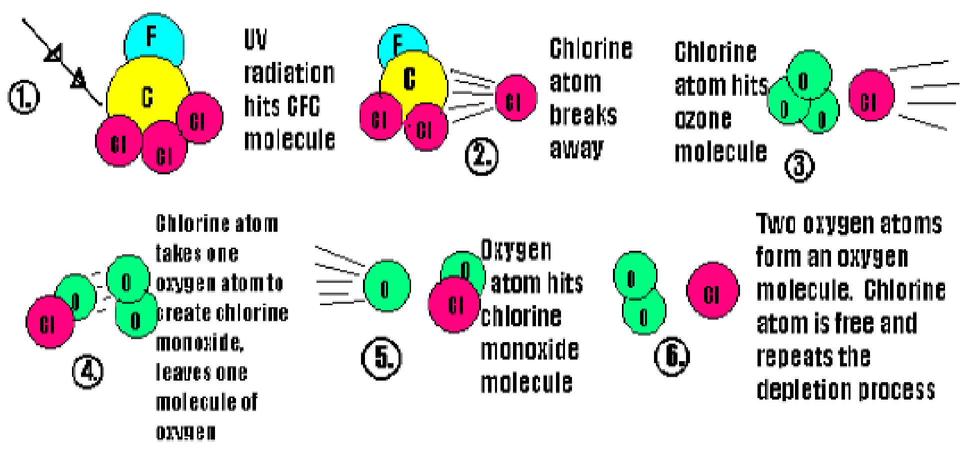

Fig.5: ozone depletion reaction

B. Rocket launches:

The global market for rocket launches may require morestringent regulation in order to prevent significant damage toEarth's stratospheric ozone layer in the decades to come,according to a new study by researchers in California andColorado. Future ozone losses from unregulated rocketlaunches will eventually exceed ozone losses due to

Chlorofluorocarbons, or CFCs, which stimulated the 1987Montreal Protocol banning ozone-depleting chemicals, saidMartin Ross, chief study author from The AerospaceCorporation in Los Angeles. The study, which includes theUniversity of Colorado at Boulder and Embry-RiddleAeronautical University, provides a market analysis for

Estimating future ozone layer depletion based on the expectedgrowth of the space industry and known impacts of rocketlaunches." As the rocket launch market grows, so willozone-destroying rocket emissions," said Professor DarinToohey of CU-Boulder's atmospheric and oceanic sciencesdepartment. "If left unregulated, rocket launches by the year2050 could result in more ozone destruction than was everrealized by CFCs."Since some proposed space efforts wouldrequire frequent launches of large rockets over extendedperiods, the new study was designed to bring attention to theissue in hopes of sparking additional research, said Ross. "Inthe policy world uncertainty often leads to unnecessaryregulation," he said. "We are suggesting this could beavoided with a more robust understanding of how rocketsaffect the ozone layer." Current global rocket launchesdeplete the ozone layer by no more than a few hundredths of1 percent annually, said Toohey. But as the space industrygrows and other ozone-depleting chemicals decline in theEarth's stratosphere, the issue of ozone depletion from rocketlaunches is expected to move to the forefront. Highly reactivetrace-gas molecules known as radicals dominate stratosphericozone destruction, and a single radical in the stratosphere candestroy up to 10,000 ozone molecules before beingdeactivated and removed from the stratosphere.

C. Global Warming:

Global warming also leads to ozone layer depletion. Due to global warming and greenhouse effect most of the Heat is trapped in troposphere which is the layer below the stratosphere. As we all know ozone is present in Stratosphere so heat don't reaches troposphere and it remain cold as recovery of ozone layer requires maximum Sunlight and heat so it leads to depletion of ozone layer.

D. Nitrogenous Compound:

Nitrogenous Compounds emitted by human activities in small amount like NO, N2O and NO2 are considered to be greatly responsible for the depletion of ozone layer.

9. EVIDENCE FOR OZONE DEPLETION

In 1974, after millions of tons of CFCs had been manufactured and sold; chemists F. Sherwood Rowland and Mario Molina of the University of California began to wonder where all these CFCs ended up. Rowland and Molina theorized that ultraviolet (UV) rays from the Sun would breakup CFCs in the stratosphere, and that the free chlorine at oms would then enter into a chain reaction, destroying ozone. Many people, however, remained unconvinced of the dangeruntil the mid-1980s, when a severe springtime depletion of zone was first monitored by the British Antarctic Survey a bove Antarctica. The depletion above the South Pole was so severe that the British geophysicist, Joe Farman, who firstmeasured it, assumed his spectrophotometer must be broken and sent the device back to England to be repaired. Once the depletion was verified, it came to be known throughout the world through a series of NASA satellite photos as the Antarctic Ozone Hole. Laboratory studies backed by satellite and ground based measurements, show that free chlorin ereacts very rapidly with ozone. They also show that the chlorine oxide formed in that reaction undergoes further processes that regenerate the original chlorine, allowing these quence to be repeated up to 100,000 times. This process isknown as a "chain reaction". Similar reactions also take place between bromine and ozone. Observations of the Antarctic zone hole have given a convincing and un mistakable demonstration of these processes. Scientists have repeat edlyobserved a large number of chemical species over Antarctica since 1986. Among the chemicals measured were ozone and chlorine monoxide, which is the reactive chemical identified in the laboratory as one of the participants in the ozone-destroying chain reactions. The satellite maps shown in the figure below relate the accumulation of chlorine monoxide observed over Antarctica and the subsequent zone depletion that occurs rapidly in a few days over verysimilar areas.

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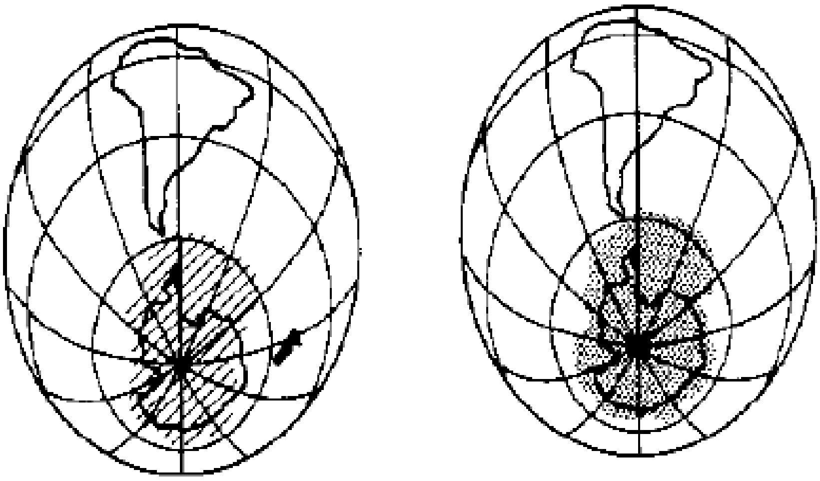
Chlorine Monoxide and the AntarcticaOzone hole latest August 1996:



I: Region of High Chlorine Monoxide (ClO) **II: Region of low Ozone ($O_{3)}$**

Fig.6: ozone depleting agents over earth

10. EFFECT OF OZONE LAYER DEPLETION

Ozone depletion is affecting the human health and environment negatively, as it allows the penetration of UV radiations to reach the Earth. These radiations can cause severe diseases in humans such as skin cancer, eye damage and genetic mutations etc. Furthermore the ozone depletion is affecting the aquatic life, biogeochemical cycles, air quality and also contributing in Global warming but in this review paper our main focus ison the effects of ozone depletion on human health.

A. Effects on Eyes:

The major cause of blindness in this world is cataracts. There would be 0.3% - 0.6% increase in risk of cataractif there will be 1% decrease in Ozone level. Eye lens can be damaged by oxidative agents. Oxidative oxygen Produced by UV radiation can severely damage eye lens and cornea of eye is also badly damaged by UV radiation .Photo keratitis, cataract, blindness all are caused due to UV rays.

B. Effects on Skin:

Exposure to UV radiations can cause skin cancer. UV radiations alter the structure of biomolecules and thus leadto different diseases.] Skin is the most often exposed part of body to UV radiations there are two types of skin cancer, Melanoma and Non-melanoma. Melanoma is most serious form of cancer and is often fatal, while non-melanoma is most common type and less fatal. Depletion of ozone layer leads to both Sun burn and skin cancer .UV radiations are also responsible for breast cancer and leukemia. Epidemiological studies of Melanoma indicate that the incidence of melanoma is increasing in those countries having high ratio of cases. As UV radiations can penetrate more easily in thin skin so there is greater number of incidence is found in thin skinned people. It is found that the incidence of Melanoma is more in children than adults. The chance of incidence of melanoma is correlated with UV exposure furthermore the survival chance of melanoma is less in boys as compared to girls .As the intensity of radiation increases in summer so the risk of melanoma in thin skinned people is increased in summer and it is more in females as compared to males as their skin is thinner than males .There is considerable relationship between melanoma risk and intermittent sun exposure and sunburn history. There is also a direct relationship between air travelling and melanoma incidence .However the studies revealed that genetic factors contribute more for having melanoma disease than behavioral aspects. The epidemiological studies of non-melanoma skin carcinoma (NMSC) indicates that its risk is more in young females in lower limbs and sunbathing increases its risk five times in trunk region.

C. Effects on Human Immunity:

Exposure to UV radiations can also result in suppression of immune response to skin cancer, infectious diseasesand other antigens .The immunosuppression is due to changes in skin photoreceptors and antigen presenting cells that are brought by UV radiations .More increase in depletion of ozone results in more decrease in immune system.

D. DNA Damage and Lung Diseases:

Short exposure to UV-B radiations can cause the DNA damage because UV radiations can disturb biomoleculessuch as lipids, proteins and Nucleic acids. Due to UV-B radiations there would be cryptic transposable elements which may lead towards the mutations which is more dangerous than the immediate DNA damage .Excessive

UV-B radiation exposure results in the basal and squamous cells carcinomas. These types of cancers are induced due to transcriptional errors during DNA replication which are caused by changes in pyrimidine bases. The ultimate cause of this whole mechanism is found to be the prolonged exposure to UV radiations. It is estimated that there is increase of 2% of incidence of these cancers by 1% depletion of ozone layer .Exposure to UV radiations equally affects lungs. Bronchitis, obstruction of lungs, Emphysema, asthma all can be resulted from UV radiations exposure.

E. Effects of Hydrogen Peroxide on Human Health:

Due to stratospheric ozone layer depletion UV radiations are penetrating in earth atmosphere which result in theproduction of reduced oxygen. Highly reactive species like hydrogen peroxide is produced which has bad effects on human health. It is ideal photochemical maker due to its long life and stability .Hydrogen peroxide is toxicant and it pollutes drinking water especially in lakes and makes water toxic and unfit for drinking. IT alters redox chemistry of metals that are used by our body like iron copper and manganese.

F. Effect of Food Shortage on Human Population:

Depletion of ozone layer is also causing the problem of food shortage to humans. UV radiations are disturbingdevelopmental and physiological processes which is decreasing the productivity of crops. As humans are heavilydependent on crops for food so there is a great chance if depletion of ozone layer is not checked it may cause seriously shortage of food to humans .Researches also show that UV radiations can also be used to enhance yield of crops by the use and application of phytohormones.

11. CONCLUSION AND RECOMMENDATIONS

Under the auspices of United Nations Environment Programme (UNEP), Governments of the world, including the United States have cooperatively taken action to stopozone depletion with the "The Montreal Protocol on Substances that Deplete the Ozone Layer", signed in 1987.Scientist's are concerned that continued global warming will accelerate ozone destruction and increase stratospheric ozon edepletion. Ozone depletion gets worse when the stratosphere(where the ozone layer is), becomes colder. Because global warming traps heat in the troposphere, less heat reaches the stratosphere which will make it colder. Greenhouse gases act like a blanket for the troposphere and make the stratosphere colder. In other words, global warming can make ozone depletion much worse right when it is supposed to begin its recovery during the next century. Maintain programs to ensure that ozone-depleting substances are not released and ongoing vigilance is required to this effect. In fact, global warming, acid rain, ozone layer depletion, and ground-level ozone pollution all pose a serious threat to the quality of life on Earth. They are separate problems, but, as has been seen, there are links between each. The use of CFCs not only destroys the ozone layer but also leads to global warming**.** Ozone layer is continuously depleting which is highly alarming situation of today. Chlorofluorocarbons are major cause of ozone depletion. These substances should be banned or we should use their alternatives so that in future we can protect ourselves from the harmful effects of UV radiation. Human eye and skin are the most exposed part of the body to these radiations. So there is high degree of incidence of blindness and skin cancer disease increasing day by day with the depletion of ozone layer so we should use sunglasses and full body clothes especially in summer when there is high intensity of sunlight so that we can protect our body from harmful UV radiations. We should also use sun block creams to our most exposed parts of body like face. We should also don't consume water from lakes as it may contain high quantity of hydrogen peroxide which is toxic to our bodies, and we should consume water for drinking from clean water sources.

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