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Need for Public Awareness to Ozone Layer Depletion: A Sustainable Approach

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Abstract: ***Our environment affected by various human activities, ozone layer depletion is one of them. Ozone layer in stratosphere protects life on earth from exposure to dangerous levels of UV light. The ozone layer depletes are CFC, halons, methyl bromide and nitrous oxide. The depletion of ozone layer leads to higher levels of UV radiation reaching earth's surface & causes skin cancer, cataracts, impaired immune system & also reduced crop yields.***
This paper discuss the origin , causes, effects, various ways adopted for management of this problem & focused a need for involvement of international population [public awareness] over the management of ozone layer depletion.
Key words: Environment, ozone layer depletion, UV light, Chloro fluoro carbon, Public awareness.

I. INTRODUCTION

Ozone layer: Ozone layer located in stratosphere, a compartment of Earth's atmosphere above 10km to50 km earth [1]. This is discovered by Charls Fabry & Henri Busson in 1913. Ozone consist of three atoms of oxygen bounded together.

$$O + O + O = O_3$$

It is colorless & has a very harsh odour. The amount of ozone in this layer is 10 ppm [2] & it is highest in 19 to 23 km[3]. In an unpolluted atmosphere there is a balance between the amount of ozone being produced & the amount of ozone being destroyed. Ozone layer absorb a lot of UV rays have high frequency & responsible for various damage of life by causing such diseases like skin cancer & cataracts.

II. OZONE LAYER DEPLETERS

Dobson Unit measures the total amount of ozone in atmosphere & the term ozone hole should be applied for regions where ozone depletion is so severe that levels fall below 200 Dobson Unit [D.U.].Ozone naturally broken by Photochemical reactions & chemical reactions with various compounds containing N,H,Br,Cl in very small amount. But due to human activities some chemical compounds emitted & the natural balance between the production & destruction of ozone disturbed.
These are ---

OLDs Source Gasses
- CFC-12
- CFC-11
- CFC-113
- CFC-114
- CFC-115
- Freon-12
- Freon-11
- CTC
- Me-Br
- Nitrous Oxide

Reactive Halogen Gasses
- HBr,
- HCl, Br, Cl
- BrONO2, ClONO2,
- ClO, BrO,

OLDs Release through products

Solvent cleaning products ==== 36%
Refrigeration & Air-conditioning ==== 29.6%
Aerosols ==== 5.17%
Foam Products ==== 14.3%
Solvent changing products ==== 36.15%

CFC was the prime substance for causing ozone depletion. It was established that one molecule of CFC is capable of destroying one lakh ozone molecules in the stratosphere.

60 Yrs ago CFCs were invented in the United state, It is safe , non toxic, non flammable , alternative of substances like NH_3 & found many uses throughout the world in refrigerators, air conditioners& other industrial purposes.

But it is responsible for approximately 80% of stratosphere ozone layer depletion. Rowland & Molina explained that the UV rays breakup CFCs in the stratosphere release free chlorine, destroying ozone [4]. In this process Ozone converted in to O_2 & release Cl^0 free to repeat the process up to 100,000 times.

$$CCl_2F_2 \text{ ===== } CClF2 + Cl^0$$

$$Cl^0 + O_3 \text{ ===== } ClO + O_2$$

$$ClO + O \text{ ===== } Cl^0 + O_3$$

Some other Ozone layer degrading chemicals are CCl_4 & $CHCl_3$ are used as solvents for industrial applications. Halons are used in fire extinguisher; Bromine is 40 times more efficient at destroying ozone than chlorine.

Chlorine & Bromine are very stable, not soluble in water & not broken chemically in lower atmosphere but decomposed by intense sunlight [5].

III. EFFECTS OF OZONE LAYER DEPLETION

Increased the % of solar UV-B radiation affect human health with risks of eye disease,skin cancer & infectious diseases [6]. It damages the cornea, lens of the eye & affects the immune system causing a no. of infectious diseases. It develops nonmelnoma skin cancer [NMSC].

UV-B radiation also affects physiological & developmental process of flora. UV-B radiation affects breeding of plants, change species composition & alter the bio-diversity. It also changes Plant form, secondary metabolism, plant competitive balance, plant pathogens & bio- geochemical cycles.

UV exposure affect productivity of aquatic system, 6-12% reduction in production of phytoplankton have reported due to increase in UV-B, It also affect reproductive capacity & development of fish shrimp, crab, amphibians & other animals.

Increased UV radiation alters bio-geochemical cycles.

An increased level of UV radiation adversely affect synthetic polymers, bio polymers, Air quality, chemical reactivity of troposphere & responsible for heating of atmosphere [green house effect].

IV. MANAGEMENT OF OZONE DEPLETERS

Protection of ozone layer in stratosphere is the need of the hour, A no. of steps can be taken both as individuals & as group to protect declining earth's ozone layer.

China, India & South chorea were found to account for around 70% of global CFC production [7].But South chorea ban CFC production in 2010[8].

In a meeting of 32 countries inWashington D.C. world plan an action on ozone layer with UNEP [United Nation Environmental program].In September 1987 the Montreal protocol on substances that deplete the ozone layer was signed by 24 countries & controlled 96 ODCs. The protocol aimed to decrease the use of OLDs by 50% in 1999.

An agreement also made in 1990 [London] & in 1992 [Copenhagen] .Here the countries agreed to stop using CFCs & other depletes. But in 2006 UNEP recognized 16, 000—38,000 tones of CFCs passed through the black market in the mid 1990s.

In 1970 after the first warning of damage to ozone layer work on alternatives for CFCs began, the replacement for CFCs are HCFCs , which deplete stratospheric ozone but to a much lesser extent than CFCs[9]. Unlike CFCs, HCFCs & HFCs have an ozone depletion potential minimum.

In September 21, 2007 approximately 200 countries agreed to accelerate the elimination of CFCs entirely by 2020 in a United Nations sponsored Montreal summit, Many nation such as United states & China agreed with the accelerated phase out schedule[10].Australia, Canada also provide a framework for management of CFCs.

It is easy to develop & introduce the alternatives of CFCs. An international fund was therefore established to help these countries introduce new & more eco-friendly technologies & chemicals.

A. Need for public awareness

1) Involvement of International population to ozone layer protection:

Ozone hole regarded as one of the major environmental disasters of Twentieth Century. We all have been the part of ozone depletion problem, though the use of ozone depleting chemicals [ODCs] in everyday products. The age old proverb, "Everybody talks about weather but nobody does anything about it". Our activities have some

Impact on the climate, although we may not be aware of it.[11]

However we all can be the part of solution also in following way:

[a] Keep the instruments in order to avoid any leakage.

[b] Avoid any fire extinguisher that contain halons, instead use CO_2, water or dry extinguishers.

[c] Follow Montreal Protocol.

[d] Some packaging products contain HCFCs, less damage to ozone layer but increase global warning. Thus avoid them & reuse non- disposable packaging.

[e] Adult education which are all essentially complementary to each other. Green movements can grow out of small local initiatives to become major players in advocating environmental protection to the government.

[f] Environmental sensitivity in our country can only grow through a major Public Awareness Campaign. This has several tools --- the electronic media, the press, school & college education.

[g] Policy makers will only work towards environmental preservation if there is a sufficiently large bank of voters that insist on protecting the environment. Orienting the media to protect pro-environmental issues in an important aspect. Several advertising campaigns frequently have massages that are negative to environmental preservation.

[h]Appliances as Air conditioners should be leveled by warnings like ***the use of A.C. is invitation of skin & eye diseases***. Many people do not know about side effects of these appliances & CFC or ODCs, thus the Public Awareness would be a Landmark in the management of CFCs or ODCs. A revolution comes in the field by this type Slogans or Phrases & reduces the use of these appliances & decrease the emission of CFCs, HCFCs or other ODCs.

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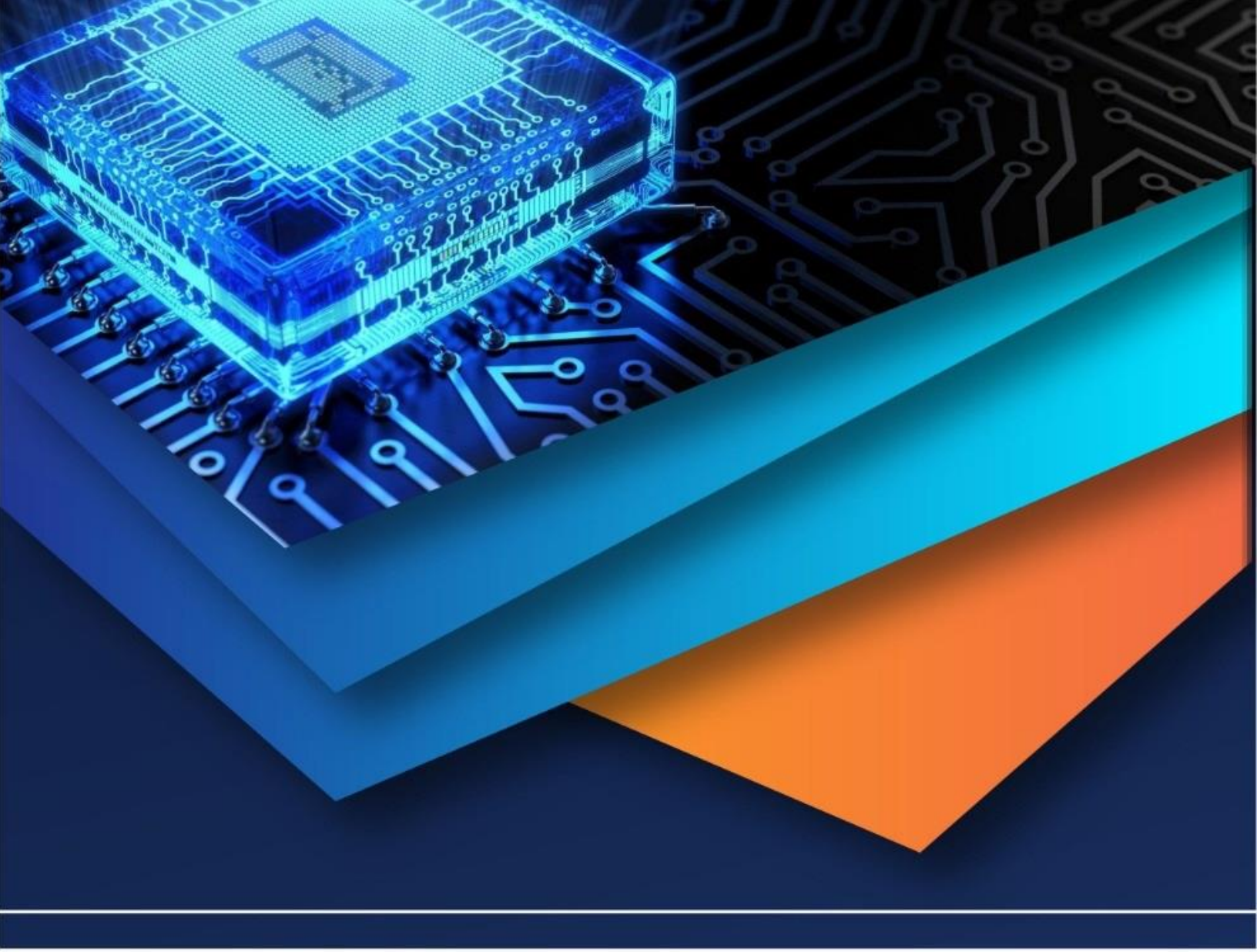

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