



Patel's View of Ozone Depletion Briefly Substantiated.

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ABSTRACT: Patel's view of ozone depletion is that "deficiency of Oxygen in troposphere causes depletion of Ozone in stratosphere". Flora of Antarctica is lower and less consequently less Oxygen is produced in the continent. Therefore, Ozone is broken down by Nitrogen / Oxides of Nitrogen to maintain Nitrogen Oxygen ratio of around 4:1 in atmosphere. Leighton relationship and NORF work in maintaining ratio. China was the biggest consumer of CFCs by 1997 but Ozone hole formed in Antarctica which is far from China. Ozone depletion (OD) is directly proportional to Oxygen deficiency (OD), "OD \propto OD" in the region. Oxygen deficiency may be either by less production or less diffusion from tropics or both. Ozone hole of Antarctica is bigger than that of Arctic explained.

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I. INTRODUCTION, RESULT AND DISCUSSION:

Trees and shrubs are not found in Antarctica but two species namely Antarctic hair grass and Antarctic pearl wood. Rest vegetation is made up of Mosses (100 species), Liverworts (25 spp.), Lichens (300-400 spp.) and macro fungi (20 spp.). Less than 1% area of Antarctica is available for colonization by plants according to British Antarctica Survey in 1985(1). Some Algae and Bacteria also reported from the cold desert (2). While global forests cover is almost 31 % of the total area of land (3). Area of the whole desert is around 14,200,000 Km² (14.2 million Km²) (4).

Atmosphere of the Earth is composed of Nitrogen (78%), Oxygen (21%), Argon (0.9%), Carbon dioxide (0.04%) and trace gases approximately (5). 30% less flora is in Antarctica in comparison to average flora of the world. Oxygen is released during photosynthesis by plants. The lower plants release lesser oxygen into environment on account of lower efficiency of Oxygen production than the higher plants. That is why, sometimes Oxygen level is found less (20.89% to 20.95%) in stratosphere of Antarctica. Imbalance between Nitrogen and Oxygen ratio of about 4:1 incites Nitrogen / Nitrogen oxides (NO) to break down unstable gas Ozone to release Oxygen molecule for the sake to maintain 4:1 ratio. A very weak force Nitrogen Oxygen Ratio Force (NORF) operates to maintain Nitrogen Oxygen ration in atmosphere. NORF excites to Nitrogen or its oxides to react with Ozone molecules and break down them to release Oxygen molecules. Diffusion force maintains equilibrium among molecules in the medium but NORF maintains ratio of Nitrogen and Oxygen percentage in stratosphere. Thereby, Ozone depletion occurs in stratosphere and Ozone hole is formed over Antarctica.

Ozone is an unstable gas in atmosphere thereof half life time is of about 25 Hours under laboratory conditions (6). The minimum 44 million tons and the maximum over 114 million tons Nitric oxide (nitrogen mono oxide, NO) is mixed into stratosphere annually by natural and manmade sources (7). Leighton relationship shows Nitrogen mono oxide breaks to Ozone and oxidized into Nitrogen dioxide (NO₂) releasing molecules of Oxygen into stratosphere. $\text{NO} + \text{O}_3 = \text{NO}_2 + \text{O}_2$, (8). Chain of such reactions takes place and Ozone molecules are broken down to release Oxygen molecules. Although Ozone - Oxygen reaction is reversible yet rate of forward reaction exceeds in case of Oxygen deficiency in the region. Forward and backward reactions are equal in stratosphere over tropical region. Therefore, Ozone holes are only formed in stratosphere of Antarctica and Arctic but not over tropics.

China was the biggest consumer of Chloroflurocarbons (CFCs) amounting 2.1 million Ozone Depletion Potential (ODP) in 1997 whereas 5 countries namely South Africa, Australia, New Zealand, Chile and Argentina which are very close to Antarctica consumed only 69,777.45 million O. D. P. at the same time (9). Distance between China and Antarctica is around 14,352 kilometers (10) and distance from the Earth surface to stratosphere is 6-50 Km (11). Generally CFCs molecules take a time of a full year to reach the stratosphere

(12,13) to 5 years (14). Earlier Patel has explained reason of Ozone depletion and solution in March 2024 (15). Provided that CFCs molecules are Ozone destroyer and reach to stratosphere within 1-5 calendar years then Ozone hole must have been formed in stratosphere over China around 2002. The Ozone holes are formed in Antarctica and Arctic region where deficiency of Oxygen is but not over China where enormous forests are. This substantiates that deficiency of Oxygen is main reason of Ozone depletion as well as formation of Ozone hole.

In the arctic region about 1,700 species of plants are found which include flowering plants, dwarf shrubs, herbs, grasses, mosses and lichens (16). China is located 1,500 Km south of the Arctic (17). The size of Antarctica Ozone hole was largest around 29.8 and 29.6 million Km² in 2000 and 2006 respectively (18). In case, CFCs are responsible for formation of Ozone holes then Ozone hole of Arctic must be larger than that of Antarctica because distance between China and Arctic is only about 1,500 Km whereas between China and Antarctica is 14,352 Km. Ozone depletion is directly proportional to deficiency of Oxygen in the region. Deficiency of Oxygen in polar region may be due to less production or less diffusion or both.

Arctic vegetation covered approximately 5 million Km² (19) while Antarctica flora covered less than 0.142 million Km² (1,3). This too much difference in vegetation area of Arctic and Antarctica makes difference in size of Ozone holes. According to Diego Loyola of German Aerospace Centre, in February 2020, size of Arctic Ozone hole was about 1 million Km² and Antarctica Ozone hole was around 20-25 million Km² with a normal duration of 3-4 months (20). More and large vegetation produce more Oxygen during photosynthesis (21).

II. CONCLUSION:

Ozone depletion is directly proportional to Oxygen deficiency in region. $OD \propto OD$.

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REFERENCES:

Original not seen, all matter searched by Google search box online in first week of June, 2024

- [1]. Plants. www.bas.ac.uk. British Antarctica Survey 1985.
- [2]. Antarctica – flora, Fauna, Ecosystems- www.britanica.com.
- [3]. Global forest area 1990-2021- Statista. www.statista.com.
- [4]. Antarctica. en.wikipedia.org – Wikipedia.
- [5]. "Earth's Atmospheric Composition: Nitrogen, Oxygen, Argon and Carbon dioxide". Earth How. 2017-07-31. Achieved from the original 2022-14-19. Retrieved 2019=10=22.
- [6]. Half-life time of Ozone as a function of air conditions and movement. McClurtin J. D. and Mailer D. E. doi:10.5073/jka.2010.425.167.326.
- [7]. Nitrogen oxides - UCAR Centre for Science Education. scied.ucar.edu.
- [8]. Burkholder, J, B, et al. (2019). Chemical kinetics and photochemical data for use in atmospheric studies. (Technical report). jet propulsion laboratory. Pasadena, JPL Publication 19-5. Also at 441 of 1610, <http://jpldataeval.jpl.nasa.gov>
- [9]. Environment > CFC > Consumption: Countries Compared – Nation Master, 1997. <https://www.nationmaster.com/stats>.
- [10]. Distance from Antarctica to China. www.distancefromto.net. Distance Between Cities on Map.
- [11]. Layers of the atmosphere. 2 Jan 2024. www.noaa.gov. National Oceanic and Atmospheric Administration.
- [12]. <https://csl.noaa.gov/faqs> [PDF].
- [13]. Chlorine and ozone. <https://www.ccpo.odu.edu>. Old Dominion University.
- [14]. How much time does it take for one CFC molecule after it is released into the atmosphere to destroy molecules of Ozone? byjus.com.
- [15]. Patel's view of Ozone depletion and solution. *International Journal of Multidisciplinary Research Review*, Vol. 10, Issue 3, March 2024, pp. 66-68.
- [16]. Plants of the Arctic and Antarctic-Beyond Penguin and Polar Bears. Beyondpenguins.ehe.osu.edu.
- [17]. China and the Arctic in 2023: Final Remarks. www.thearcticinstitute.org. The Arctic Institute.
- [18]. Polar Ozone holes. 3 October 2021. www.dcceew.gov.au. DCCEEW.
- [19]. Walker Donald A, et al. (2005). "The Circumpolar Arctic Vegetation Map". *Journal of Vegetation Science*. 16 (3):267-282. Bibcode: 2005jvegs..16..267w.doi:1103.2005.tb02365.X.
- [20]. Unusual ozone hole opens over the Arctic, 6 April 2020. www.esa.int. European Space Agency.
- [21]. www.google.com.