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Research Paper

The Antarctica Ozone Hole May End only in Ten Billon Dollars.

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ABSTRACT: *Main cause of the Ozone hole formation is deficiency of Oxygen in the region assisted with wind wall. Supply of Oxygen rich air from nearby forests may solve this problem. Micro-propagation of local flora is the best solution.*

KEYWORDS: *Vortex, Prevent, Air, Mixing, Ozone, Depletion.*

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Problem: Although automatic decomposition of Ozone regularly occurs in the whole atmosphere throughout year due to its short life-time (1, Todor). In the Antarctica concentration of Oxygen is slightly lower (20.82 to 20.90%) than in rest of the world (20.93 to 20.96 %), in general average is 20.95%. Means 0.11 to 0.14 % Oxygen is less in the Antarctica (2, Kanwisher). In winter season usually from April to September (Google search), a polar vortex (wind wall/barrier) is formed which prevent mixing of air into the Antarctica from its surrounding atmosphere (3,NOAA). The Chapman cycle naturally runs in the atmosphere under UV radiations, reversibly forms Ozone and Oxygen for maintenance of standard concentrations of these gases. The decomposition of Ozone owing to its temperature dependent short half life-time is higher than to its formation in the lower stratosphere over the Antarctica. The reason is lower concentration of Oxygen in troposphere of the Antarctica due to less production and less diffusion from surroundings. The polar vortex functions as a diffusion barrier that prevents mixing of inner cold air of Antarctica with warm air of surrounding atmosphere. The Antarctica becomes an isolated locked region for about 5 months, May to September, meanwhile, the Chapman cycle drives ozone decomposition, and some of released Oxygen is taken by adjacent troposphere. Consequently, in the lower stratosphere the concentration of Ozone gas gradually becomes less than 220 Dobson Units over the Antarctica called the Antarctica Ozone hole.

Generally under normal situations the world average concentration of Ozone in the stratosphere is around 300 Dobson Units while in the troposphere approximately 10-20 Dobson Units (Google search). In my view: “An Ozone hole is a region in the stratosphere whereon concentration of Ozone gas is less than 220 Dobson Units”.

Solution: Expenditure for lying a gas pipeline between Iran and India is estimated approximately 4.50 billion Dollars (US). Distance of pipeline is approximately 1,400 Kilometers (4, Pipeline). Peninsula of the Antarctica is approximately 1,000 Kilometers far from the forests of Tierra del Fuego National Park in Argentina (5, Stewarts). 4.00 billion dollars (US) is approximately 0.81 % of annual revenue ($ 4.92 trillion) of United States according to U. S. Department of the Treasury, October 2023 (6, Yellen). The Ozone hole recovery may be by 3 ways: (i) Gas pipeline: If an offshore gas / air pipeline is laid from Tierra del Fuego National Part to peninsula of the Antarctica then expenditure on this project is assumed around 4.00 billion dollars (US). Oxygen rich air (20.95%) may be supplied to Antarctica whereon Oxygen is in slighter lower concentration (20.82 - 20.90 %). Oxygen is reactant in reversible reaction of Ozone formation. Both forward and backward reactions run equally if Oxygen is sufficient in the medium, here air. Net Ozone depletion will not occur at all on equilibrium. United State alone can solve this problem by a donation of 10 billion dollars. (ii) Micro-propagation: The Antarctica is very poor in vegetation hence Oxygen production is always negative. Indigenous flora may be enriched applying biotechnological methods like micro-propagation, and (iii) Plantation: Plantation in sub-Antarctic region may suffice Oxygen to some extent in the Antarctica..

According to Le Chatlier principle "a catalyzed reversible equally runs in both forward and backward directions to achieve equilibrium". If, Chatlier principle is right then no role of any catalyst in Ozone depletion.

Erratum: Increase of 2 billion hectare forests cover was erroneously types in place of 2 % forest cover, in topic of conclusion, in IJMDRR, volume 10, issue 10, page number 42, (2024).

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