Ozone Depletion and Air pollution

# Ozone Hole:

## History:

* Till the late 70s of the past century scientists started noticing that the amount of Ozone seen is decreasing from spring to another. (1)
* In a study made by NASA, it was discovered that the minimum amount of Ozone seen in 1975 has been decreased by 40% till 1984. (1)

## Scientific causes:

* The main commonly known reason for the Ozone destruction is the spread of CFCs (Chlorofluorocarbon compounds) in the air till it rises and reaches the stratosphere layer as a result of mixing with other atmospheric gases chemically. (2)
* CFCs aren’t active or dangerous at all on Earth surface, but it is highly reactive and dangerous in high altitudes i.e. Carbon tetra fluoride CF4 is unreactive at altitudes less than 50 kilometers above sea level. (2)
* The stratospheric Ozone depletion occurs as a result of a catalytic chemical reaction needing man made CFCs which depleted around 10% of the Ozone layer till 1999 only! (3)
* The CFCs is mainly used till now in cooling devices such as: ACs, Refrigerators, Some filters and propellants. (2)
* On the other hand CF4 is produced mainly as a by-product in the aluminum manufacture. (2)

## Ozone Depletion Effects:

* Ozone depletion increased the UV-B radiations at the Earth surface which has primarily adverse effects on eye and skin. (4)
* Solar UVR results skin cancers including melanoma or non-melanoma skin cancers, furthermore it causes basal cell carcinoma and squamous cell carcinoma. (4)
* Surprisingly Ozone layer depletion doesn’t affect plants’ photosynthesis, chlorophyll or even pigments concentrations!

But actually it decreases the shoot biomass & the area of the leaf only and only when exposing all leaf under high levels of Ozone depletion area (UV conc. is high). (5)

* Ozone depletion also affects animals i.e. Squamous cell carcinomas (which affects human) disease rate increase in the exposed non-pigmented cells of animals (cats, cattle, etc.)

Also Uberreiter’s syndrome in dogs is caused by UV-B exposure.

As all this diseases continue to affect animals: domestic animals which have a great economic value and also have alimentary value.

Worse even might happen where these diseases might transfer to human and be lethal by evolution as COVID 19 case. (6)

## Ozone hole nowadays:

* Today, Ozone hole still exists, forming every year over Antarctica in spring and closing up in summer and the cycle continues.
* Susan Solomon says that Ozone hole is starting to disappear and recover and it is expected to return to pre-1980 levels in the middle of this century. (7)

# Air pollution:

## Scientific causes (sources):

* Smoke resulted in energy production (petroleum, gasoline, coal, etc.) in cars, factories, trains, etc.
* Composition of organic materials (cigarettes, wood, etc.).
* Composition of petrol products such as plastics.
* Nuclear reaction by-products (gases).
* Increase one of atmospheric air components percentage (CO2 ).

## Effect of air pollution:

* It causes many serious diseases especially to the respiratory system such as lung cancer.
* Smelling or breathing some toxic gases from nuclear reactions may be lethal and cause death immediately.
* It affects plant life and hardens plants photosynthesis process.
* It affects animals too and may lead to death.

# Young Effectors Solutions

* Increasing number of conventions that focus on Environmental issues (like Montreal’s)
* Limit the manufacture of CFCs until finding an alternative to it then stop it immediately.
* If you fear the punishment you’ll never make the mistake so we must aim on increasing summer programs that aims on warning teenagers from consequents of polluting air or depleting ozone.
* Sharing awareness to people unconsciously as playing on people minds has a great effect, we can do this by putting it in TV series, ads, gratifies.
* Working and cycling instead of using cars and means of transport.
* Planting lots of trees in residential areas and around factories to take the ex-CO2.
* Using renewable energy sources as water energy and wind energy.
* Making youth conferences in order to give them chance to be creative and always every generation has its own solutions to its own problems.

Resources:

1. Reflection on the ozone hole by Jonathan Shanklin.
2. How Chlorofluorocarbons (CFCs) get to the Stratosphere when they are heavier than air.
3. <https://uk-air.defra.gov.uk/research/ozone-uv/moreinfo?view=cfc-stratosphere>
4. Stratospheric ozone depletion A review of concepts and story by Susan Solmon.
5. The effects on human health from stratospheric ozone depletion and its interactions with climate change by (M. Norvala, A. P. Cullenb, F. R. de Gruijlc, J. Longstrethd, Y. Takizawae, R. M. Lucasf, F. P. Noonang and J. C. van der Leunh).
6. A meta-analysis of plant field studies simulating stratospheric ozone depletion by (Peter S. Searles, Stephan D. Flint & Martyn M. Caldwell).
7. Stratospheric ozone depletion and animal health. <https://europepmc.org/article/med/1529513>
8. What happened to the world’s ozone hole? by Kira Walker for BBC future.

## This Research was done by the

**Young Effectors dd**

**Research collected by: Young effectors**