OZONE LAYER DEPLETION

Ozone is a poisonous gas made up of molecules consisting of three oxygen atoms. Ozone is extremely rare in the atmosphere, accounting for just three out of every 10 million molecules. Most of the ozone exists in the upper atmosphere or stratosphere, between 10 and 50 km above the earth.

The ozone layer is essential for life on earth, because it absorbs most of the harmful ultraviolet-B (UV-B) radiation from the sun. It also completely screens out the deadly UV-C radiation. When the ozone layer gets depleted, more UV-B radiation reaches the earth. The result is an increase in skin cancers, eye cataracts, weakened immune systems, reduced plant yield, damage to ocean ecosystems, and reduced fishing yields and adverse effects on animals.

British Antarctic survey scientists first discovered that ozone layer was depleting and reported their findings in may 1985. Meanwhile, Pawan Bhartia and other scientists at NASA found a large ozone hole over Antarctica and reported it in august 1985. This created a big scare of possible widespread cancer. The ozone hole, however was happening mostly over Antarctica and that too for just two months a year. Nevertheless, the issue was serious and anyone could see the hole in the satellite pictures.

Causes

In the 1970s, scientists had discovered that chlorofluocarbons (CFCs), broke apart in the atmosphere and released chlorine atoms. This cause the ozone depletion. The same effect resulted when bromine atoms. This caused the ozone depletion. The same effect resulted when bromine atoms were released by halons. Thus, CFCs and halons are examples of Ozone Depleting Substances (ODS).

USES OF ODS

Chlorofluorocarbons (CFCs): Used as refrigerants and aerosol propellants, for making plastic foam, cleaning of electronic equipment.

- Halons: used in fire extinguishers.
- Carbon tetrachloride: used in the manufacture of synthetic rubber, the production of pesticides and pharmaceuticals.
- Trichloroethane: a versatile, all-purpose solvent.
- Hyddrochlofluororcarbons (HCFCs): Developed as an interim replacement for CFCs much less harmful than CCFCs.
- Methyl bromide: a powerful fumigant used to destroy pests.

Even as scientific studies were going on, the land area under the ozone-depleted atmosphere increased steadily to more than 20 million sq. km. in the early 1990 and has varied between 20 and 29 million sq.km since then. In 2000, the area of the ozone hole reached a record 29 million sq.km.

No large hole has appeared else where, but there is a 30% thinning of the ozone layer over the north pole during the arctic spring. The depletion over Europe and other high latitudes varied between 5% and 30%.

Why does the ozone hole develop mostly over Antarctica and not over places where ODS are used heavily?

In May June, strong winds in the stratosphere above Antarctica form an enormous ring of moving air, called the polar vortex. The temperatures inside the Antarctic polar vortex fall so low that water vapour condenses into extremely small icy particles. Which form Polar Stratospheric Clouds (PSCs). Special reactions that occur on PSCs, combined with the relative isolation of polar stratospheric air and sunlight allow chlorine and bromine reactions to produce the ozone hole in Antarction springtime.

What were the international initiatives to contain the depletion of the ozone layer?

Remarkably enough, the international negotiations on containing the ozone hole began as early as 1981, when the scientific aspects were not totally clear. It was viewed as one of the major environmental disasters of the twentieth century and policy makers were convinced that quick action was needed.

After four years of negotiations, the UN adopted the Vienna Convention for the Protection of the ozone layer in March 1985, which came into force in 1988. It is often called a framework convention, because it served as a framework for efforts to protect the earth's ozone layer. In 2009, the Vienna Convention became the first

Convention of any kind to achieve universal ratification.

The objectives of the Convention were for the countries to promote co-operation by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.

The Vienna Convention did not contain legally binding controls or targets. However, it set an important precedent .For the first time, nations agreed in principle to tackle a global environment problem before its effects were felt or even conclusively proven by science.

Once the scientific observations confirmed the ozone hole, governments recognized the need for stronger measures to reduce the production and consumption of a number of CFCs and several halons. Thus, the Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in September 1987 and came into force in 1989.

The world will achieve the final phase-out of ODS in 2016 with the phase-out of CFCs used in Metered-Dose Inhalers (MDIs). This will be a significant milestone following 30 years of concerted global action to protect the ozone layer.

But for the Protocol, the amount of ODS in the atmosphere would have been five times greater by 2050. Ozone depletion would have risen to more than 50% in the northern hemisphere's mid-latitudes and 70% in the southern mid-latitudes, about 10 times worse than current levels.

Again, if there were no such Protocol, the UV-B radiation reaching the Earth would have doubled in the highly populated northern mid-latitudes and quadrupled in the southern latitudes. The implications of this would have been terrible: Possibly 20 million more cases of cancer and 130 million more cases of eye cataracts.