

# UV Radiation Types, Ozone Layer Depletion, Prognosis of its Evolution

## UV Radiation Types

The optic part of electromagnetic spectrum may be divided according to wavelength into UV (<400nm), visible (400-760nm) and infrared (>760nm). According to the biological effects, the UV spectrum can be divided into 3 types:

- Ultraviolet A - UV-A → 320-400nm
- Ultraviolet B - UV-B → 290-320nm
- Ultraviolet C - UV-C → 200-290nm

## UV Radiation and the Atmosphere

UV radiation, a component of sunshine, would have deadly effects on life on Earth, if all of it penetrated to the Earth's surface. In reality, radiation is absorbed by various mechanisms during its transition through the Earth's air envelop. The first absorption occurs in ionosphere, further in ozonosphere and finally in other layers of the atmosphere.

- Note<sub>1</sub>: The ionosphere is between and overlies part of thermosphere and exosphere
- Note<sub>2</sub>: The ozonosphere is located in the lower portion of stratosphere

## Ozone Layer Depletion and the Consequences

The Ozone layer depletion is associated with the massive use of freons in cooling aggregates and various pressure sprays. Freons are ChloroFluoroCarbons, also known as CFCs. This depletion of the ozone layer occurs most often in polar areas, however, during some periods, reaches over the inhabitant places. Warning situations have been noted in Australia and even over Europe. Increased transmission of UV radiation through the damaged atmosphere can signify a health risk, first for young children, whose skin is more sensitive to this exposure, and in case of deterioration of the situation, even for the rest of the population, especially for those who, because of professional or private reasons, stay often and for a long time at the sunshine.

## Atmospheric Chemical Processes

The reduction of ozone is caused by a sequence of catalytic reactions of the general scheme:



As we can see from the above reaction the active material can be released again and the whole process is repeated over and over again. This has the detrimental effect of a very rapid depletion of concentration of the ozone layer.

CFCs are non-reactive in the troposphere. On the other hand, when they diffuse into the stratosphere, they undergo their photolysis at presence of UV radiation during which a Chlorine radical is generated. The destruction of ozone is supported in addition by the presence of radicals of OH and nitrogen oxide types,

## Prognosis

Computer models have shown that if emission of freons into the atmosphere continued, a large depletion of ozone would occur at the beginning of the 21st century especially in higher latitude. Production of the most damaging depleting substances was eliminated, except for a few critical used in developed countries and should be phased out by 2010 in developing countries. It is currently estimated that the ozone depleting substances concentration in ozone layer recovers to pre-1980 levels by the year 2050.



## Links

## Bibliography

- BENCKO CHARLES UNIVERSITY, PRAGUE 2004, 270 P, V, et al. *Hygiene and epidemiology. Selected Chapters*. 2nd edition. Prague. 2008. ISBN 9788024607931.