**4-Oxygen Concentration:**An aerobe is an organism able to grow in the presence of atmospheric O2and the ones that grow in its absence is an **anaerobe**. Organisms which completely are dependent on atmospheric O2 for growth are **obligate aerobes**. Organisms which do not require O2 for growth but do grow better in its presence are called **facultative anaerobes**. **Aerotelerant anaerobes**simply ignore O2 and grow equally well whether it is present or not. **Obligate anaerobes**do not tolerate O2 at all and die in its presence. **Microaerophiles**are those organisms that are damaged by the normal atmospheric levels of O2 (20%) and require O2 levels between the range of 2% to 16% for growth. The different relationships with O2 appear due to several factors, including the inactivation of proteins and the effect of toxic O2 derivatives. Enzymes can be inactivated when sensitive groups .

Obligate aerobes and facultative anaerobes usually contain the enzymes superoxide dismutase (SOD) and catalase, which catalyze the destruction of superoxide radical and hydrogen peroxide respectively. Peroxidase also can be used to destroy hydrogen peroxide.

**5-Pressure:** Most microorganisms always are subjected to pressure of 10 atmospheres (atm). The hydrostatic pressure can reach to 600 to 1100 atm in the deep sea with temperature about 2°C to 3°C. Organisms can survive and adapt at these extreme conditions and many are barotolerant, increased pressure does adversely affect them but not as much as it does to nontolerant bacteria.

6-**Radiation:**

Sunlight is the major source of radiation on the earth. It includes visible light, ultraviolet radiation and radio waves. Most life is dependent on the ability of photosynthetic organisms to trap the light energy of the sun as visible light. Ionizing radiation, radiation of very short wavelength or high energy can cause atoms to lose electrons or ionize. The two major forms of ionizing radiation, X rays which are artificially produced and gamma rays which are emitted during radioisotope decay. Low levels of ionizing radiation will produce mutations, higher levels are directly lethal. Some prokaryotes and bacterial endospores are resistant and can cause a variety of changes in cells . Destruction of DNA is the most important cause of death of microorganisms. Ultraviolet radiation kills all kinds of microorganisms due to its short wavelength and high energy. The most lethal UV radiation has a wavelength of 260 nm, the wavelength most effectively absorbed by DNA. **Visible light**– immensely beneficial becauseit is the source of energy for photosynthesis. Visible light when present insufficient intensity can damage or kill microbial cells.