Conclusion

Scientific development, extreme industrialization and modern cultivation of farm have lead the most genuine problem of concern; the environmental pollution involves direct or indirect threat to every living organism. During the process of development the living organisms have acquired the capacity to adapt themselves to the changes in ecosystem. The adaptation process has helped the living organism to acquire the capacity to modulate their biological phenomenon so as to make their survival continue. Bacteria have the unique feature in rapidly adapting the limited to nutrient supplies and occupies hostile environments. The metabolic diversity and plasticity of bacteria in the face of environmental insults and limitations provide an immense reservoir of exploitable regulatory devices and biochemical activities.

Interest in microbial degradation of pollutants has intensified in recent years as humanity strives to find sustainable ways to clean up the contaminated environments. These bioremediation and biotransformation method endeavor to harness the astonishing naturally occurring ability of microbial metabolism to degrade, transform or accumulate a huge range of compounds including poly aromatic hydrocarbons, hydrocarbons, polychlorinated ,nitro aromatic compounds ,heterocyclic compounds like quinoline, pharmaceutical substances textile effluents and metals. The elimination of a wide range of pollutants and wastes from the environment is an absolute requirement to promote a sustainable development of society with low environment impact. Biological process plays a major role in the removal of contaminants and they take advantage of the astonishing catabolic versatility of microorganism to degrade such compounds. The huge amount of bacterial metabolomic / genomic data provides unparallel opportunities for understanding the genetic and fundamental molecular mechanism of the degradation of organic pollutants.
**Bacillus badius** D1 an alkaliphilic strain, isolated from Pristine crater lake of Lonar, MS. India, has shown the extraordinary degradation potential to words aromatic and nitro aromatic compounds. Using this bacterial strain, machinery could be setup for cleanup contaminated site as viable and dependent option for the modern technology called bioremediation. *Bacillus badius* D1 has unique feature in rapidly adapting to these hazardous chemicals as nutrients i.e source of energy and provide a dependable device to regulate the environmental problems utilizing its biochemical activities.

In present study it has been observed that the *Bacillus badius* D1 is an indigenious strain by which various recalcitrant organic compounds could get bio-transform and mineralize. This strain has shown its highest degradation ability to words nitro aromatic compounds up to their mineralization. During the mineralization process, nitro aromatic compounds were reduced to aromatic amines. These aromatic amines further systematically bio-transformed to hydroxylated products by microbial monoxygenases under aerobic condition. Similarly the oxidative stress generated by reactive species during the biotransformation of nitro aromatic compounds was counteracted by superoxide dismutase. The biotransformation of these compounds has not generated any quinone derivative. All intermediates were finally converted into aliphatic moieties by dioxygenase via cic-cic muconic acid pathway.

In addition biotransformation enzymes like cytochrome P-450, acetanilide hydroxylase, superoxide dismutase and catechol dioxygenases divulge a symbiotic action to regulate the ring cleavage strategy in response to aromatic degradation process. This indicates that the strain *Bacillus badius* D1 have the degradation potential and hence to remove a wide variety of natural and manmade aromatic and nitro aromatic compound discharge through geochemical cycles urban and industrial activities and their subsequent biotransformation in to CO₂ and H₂O.

Purification and characterization of one of the bio-transforming enzymes catechol 1,2 dioxygenase has shown multiple substrate specificity and variation in affinity for its substrates. One of these extraordinary behavior of strain *Bacillus badius* D1 i.e. the
efficiency of degradation of pollutants may helpful for possible, industrial, pharmaceutical, synthetic organic chemistry, as well as biotechnological applications in association of its effective approach to microbial bioremediation. Therefore in this study the degradation of aromatic and nitro aromatic compound by *Bacillus badius* have provided a new tool for various bioremediation processes. It also helps to investigate novel degradation pathway and the molecular adaptation strategies