

PREFACE

In the recent past, attention of researchers and scientists has been focused on environmental biotechnology. Environmental Biotechnology is co-branch of biotechnology and its goal is to manage the environmental problems that. It attempts to exploit some of the basic biological processes in cost-effective manner towards the amelioration of the degrading eco-health and eco-resources. The applications of environmental biotechnology include development of cheap rapid and reliable sensors for environmental monitoring, restoration of environmental quality effectively using environmental biotechnology, resource recovery, residue utilization and waste treatment and substitution of non-renewable resource base with renewable resources..

Biofiltration process has been demonstrated to be an effective technology for removal of VOCs and odorous compounds. Biofilter packing media may be categorized as natural, inert or synthetic packing materials. During the long-term operation of biofilter column, natural packing materials like compost, agro waste, peat, soil etc. usually crack causing medium compaction which results in the rise in the bed head loss. In order to compensate such problems, mechanically strong non-biodegradable media should be used to prevent such problems. Inert materials like PU-foam, GAC etc. are mechanically strong but usually require a periodical nutrient supply during the operation of any biofilter column and also these materials are expensive. Synthetic packing materials are of good option because they are mechanically strong and also there is no need to supply nutrients to the microorganisms because it is added in the packing media during the preparation of such packing materials. Physico-chemical properties of the modified (synthetic) materials such as porosity, surface area water retention capacity can also be improved after modification.

One of the most challenging problems to use the biofilters at industrial scale is continuous supply of nutrients in the operation. Another problem associated with natural material like compost, wood charcoal, agro waste etc. are their low durability, more compaction and poor strength. To overcome these problems, In present research work, three modified biofilter media using compost, wood charcoal and wood charcoal+compost as base material were prepared. In the preparation of the media, the

essential nutrients along with binders were added to overcome the above listed problems. The characterization results of the modified biofilter media show that modified media has better properties as compared to base material.

Chapter 1 include Introduction where I briefly described about sources VOCs, introduction to various conventional and biological processes of VOCs treatment and parameter affecting the performance of any biofiltration process. **Chapter 2** include literature survey and **Chapter 3** include method and material and experimental.

In Chapter 4, an effort has been made to develop novel biofilter media using compost as base material. In the compost, the deficient micro and macro nutrients were mixed along with poly vinyl alcohol (PVA) as a binder. PVA was used because it is a hydrophilic polymer capable of binding water. The modified media was packed in a biofilter and performance of the biofilter was evaluated for 57 days by changing the operating conditions and using Benzene, Toluene and Xylene laden air stream. **In Chapter 5**, wood charcoal based modified biofilter media as base material was prepared using same method as used in compost modified biofilter media and this modified biofilter media was tested against methyl ethyl ketone, toluene and xylene. **In Chapter 6**, we cited biofiltration of styrene in the biofilter packed with compost based modified biofilter media without supply of nutrients for 123 days under high loading conditions of styrene. **Chapter 6**, the performance of modified media (PVA/Compost+woodcharcoal /KNO₃ Composite beads) was tested against styrene laden air stream supplied to the biofilter column for the period of 131 days by changing the inlet concentration of styrene.

At last section of thesis, References and Appendix have been cited.
