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Appendix

Appendix 3 (a)

Table 3 (A). Biodegradation of *p*-cresol by various microorganisms

Microorganism	Max. Conc. (mg L^{-1}) of PC	Operating condition	Removal time	Author
***Stenotrophomonas sp.* (MF004205)**	500 mg L^{-1}	27 °C, pH 7	100% in 48 h	Bera et al., (2019)
***Serratia marcescens* ABHI001**	85 mg L^{-1}	Not available	85% in 18 h	Singh et al., (2017)
Pseudomonas putida	200 mg L^{-1}	35 °C, pH 8, Immobilized on PVA	85% in 4 h	Surkatti et al., (2014)
Pseudomonas spp.	100 mg L^{-1}	30 °C, pH 8	100% in 36.9 h	Hamitouche et al., (2014)
***Bacillus sp.* PHN 1**	4326 mg L^{-1}	30 °C, pH 7	96% in 120 h	Tallur et al., (2009)
***Pseudomonas citronellolis* NS1**	1200 mg L^{-1}	Not available	100% in 40 h	Panigrahy et al., (2020)
Advenella sp.	750 mg L^{-1}	30 °C, pH 7	100% in less than 100 h	Xenofontos et al., (2016)
***Bacillus sp.* strain PHN 1**	200 mg L^{-1}	room temp., pH 7.5, 150 rpm	100% removal in 168 h	Tallur et al., (2006)
***Stenotrophomonas maltophilia* strain KB2**	540 mg L^{-1}	30 °C, pH 7.1, 130 rpm	100% removal in 24 h	Wojcieszyńska et al., (2011)
***Arthrobacter sp*. W1**	500 mg L^{-1}	30 °C, pH 7.0, 150 rpm	100% removal in 88 h	Wang et al., (2009)

Appendix 3 (b)

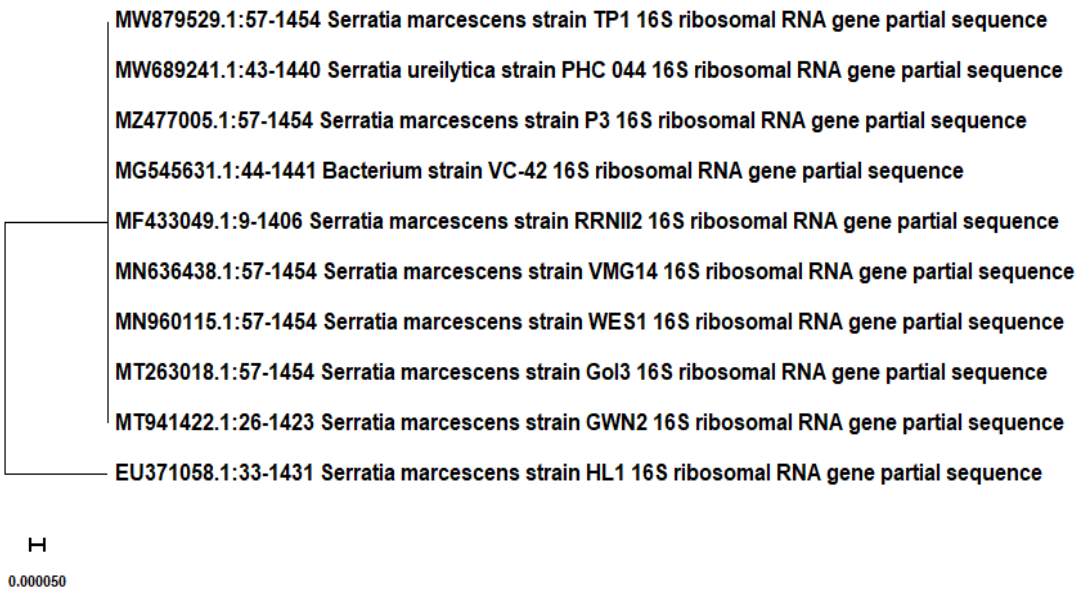

Fig. (A-3.1) Phylogenetic tree of potential bacterial species Serratia marcescens strain HL 1 after the characterization the 16S rRNA technique

Appendix 3 (c)

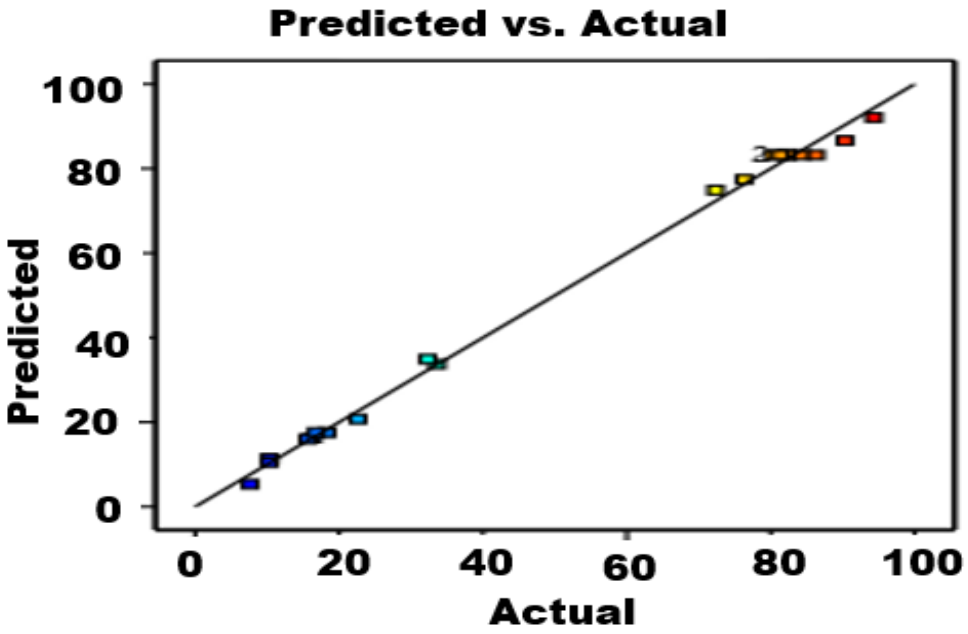

Fig. (A-3.2) Relationship between actual and predicted value

Appendix 3 (d)

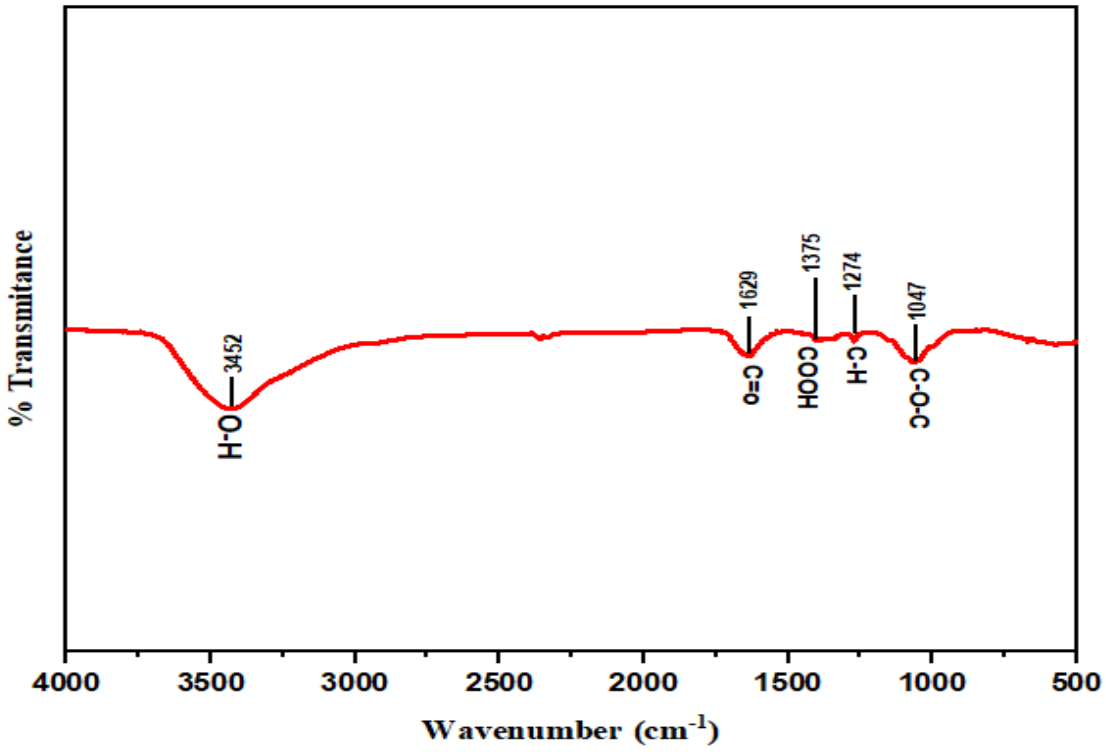

Fig. (A-3.3) FTIR spectra of *p*-cresol biodegradation

Appendix 3 (e)

Fig. (A-3.4) Seed germination

Fig. (A-3.5) Seed growth

Appendix 4 (a)

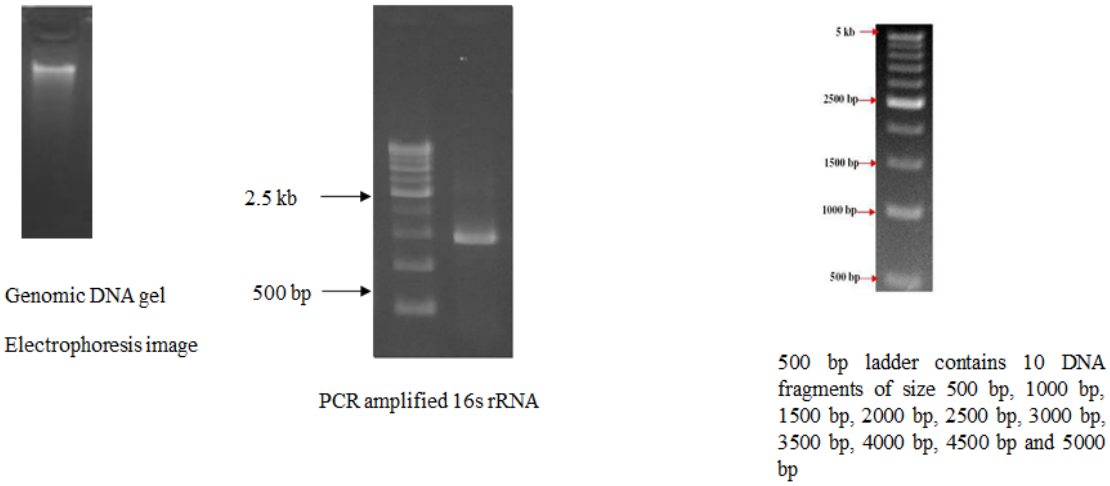

Fig. (A-4.1) Aligned Sequence (Data of Sample PCR amplification images)

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GCCGAACCGCTGGCAACAAAGGATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATTTCAC
AACACGAGCTGACGACAGCCATGCAGCACCTGTCTCAGAGTTCCCGAAGGCACCAATCCATCTC
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GCGTCAGTCTTCGTCCAGGGGGCCGCCTTCGCCACCGGTATTCCTCCAGATCTCTACGCATTTC
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GCTTCTTCTGCGAGTAACGTCAATTGATGAGCGTATTAAGTTCACCACCTTCCTCCTCGCTGAA
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TGTGCAATATTCCCCACTGCTGCCTCCCGTAGGAGTCTGGACCGTGTCTCAGTTCCAGTGTGGC
TGGTCATCCTCTCAGACCAGCTAGGGATCGTCGCCTAGGTGAGCCATTACCCCACCTACTAGCT
AATCCCATCTGGGCACATCTGATGGCAAGAGGCCCGAAGGTCCCCCTCTTTGGTCTTGCGACGT
TATGCGGTATTAGCTACCGTTTCCAGTAGTTATCCCCCTCCATCAGGCAGTTTCCCAGACATTA
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Fig. (A-4.2) Sequence of isolated bacterial species (*Serratia marcescens* strain HL1)

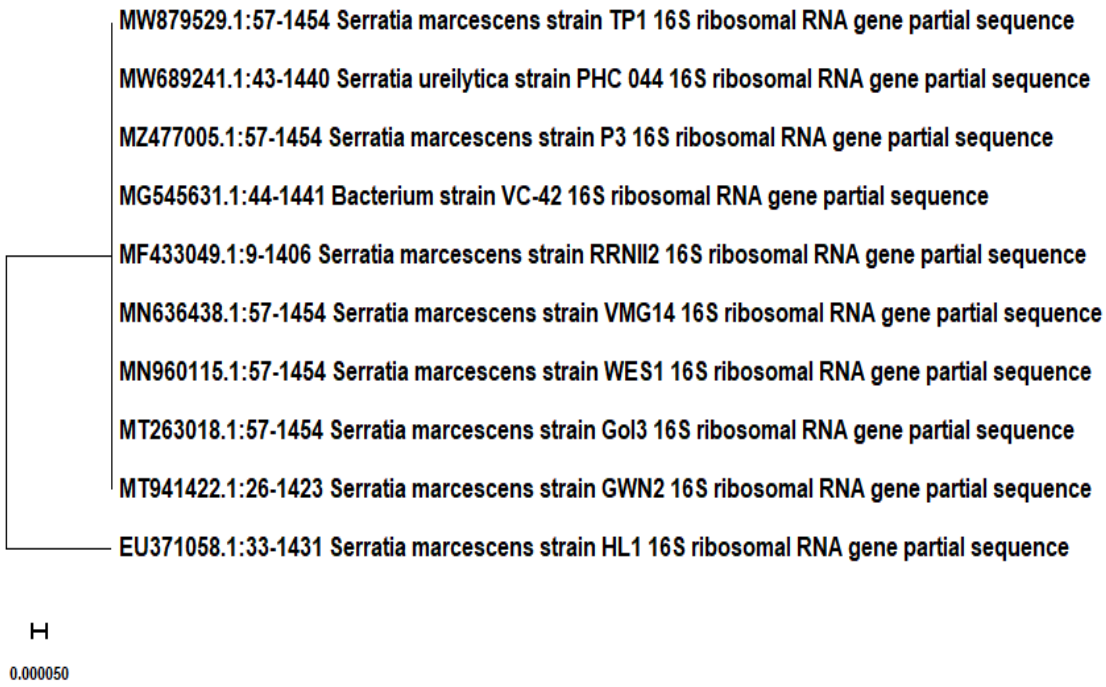

Fig. (A-4.3) Phylogenetic tree of potential bacterial species *Serratia marcescens* strain HL 1 after the characterization the 16S rRNA technique

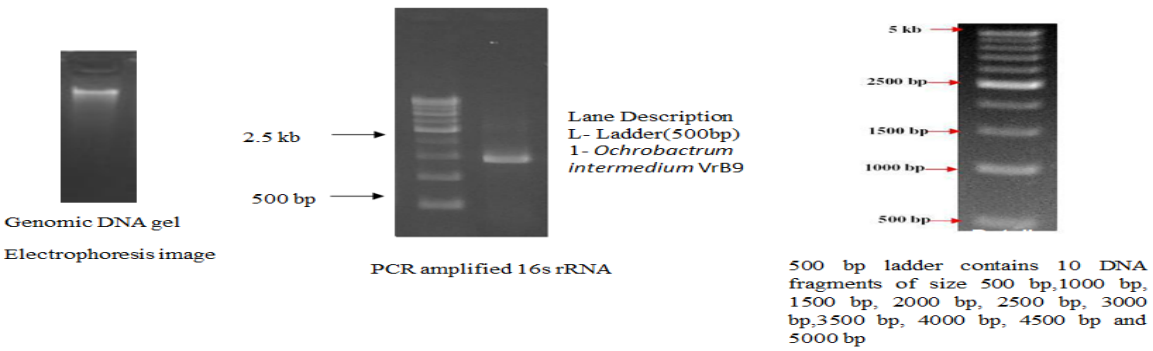

Fig. (A-4.4) Aligned Sequence (Data of Sample PCR amplification images)

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TCGCGTGCTCGCTGCCCACTGTCACCACCATTGTAGCACGTGTGTAGCCCAGCCCGTAAGGGCC
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CACATGCTCCACCGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAATCTTGCGACCGTAC
TCCCCAGGCGGAATGTTTAATGCGTTAGCTGCGCCACCGAAGAGTAAACTCCCCAACGGCTAAC
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TTCATCACTCACGCGGCATGGCTGGATCAGGCTTGCGCCCATTGTCCAATATTCCCCACTGCTG
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TGCCGATAAATCTTTCCCCCCCATAAAATGCCAGGGCATTTTATGATTCCTGAAATTTTAAAGG
GGGGCACATACGGTATTAGCACAAGTTTCCCTGAGTTATTCCGTAGCAAATGGTACGTTCCCAC
GCGTTACTCACCCGTCTGCCGCTCCCCTTGCGGGGCGCTCGA

Fig. (A-4.5) Sequence of isolated bacterial species (*Ochrobactrum intermedium* VrB9)

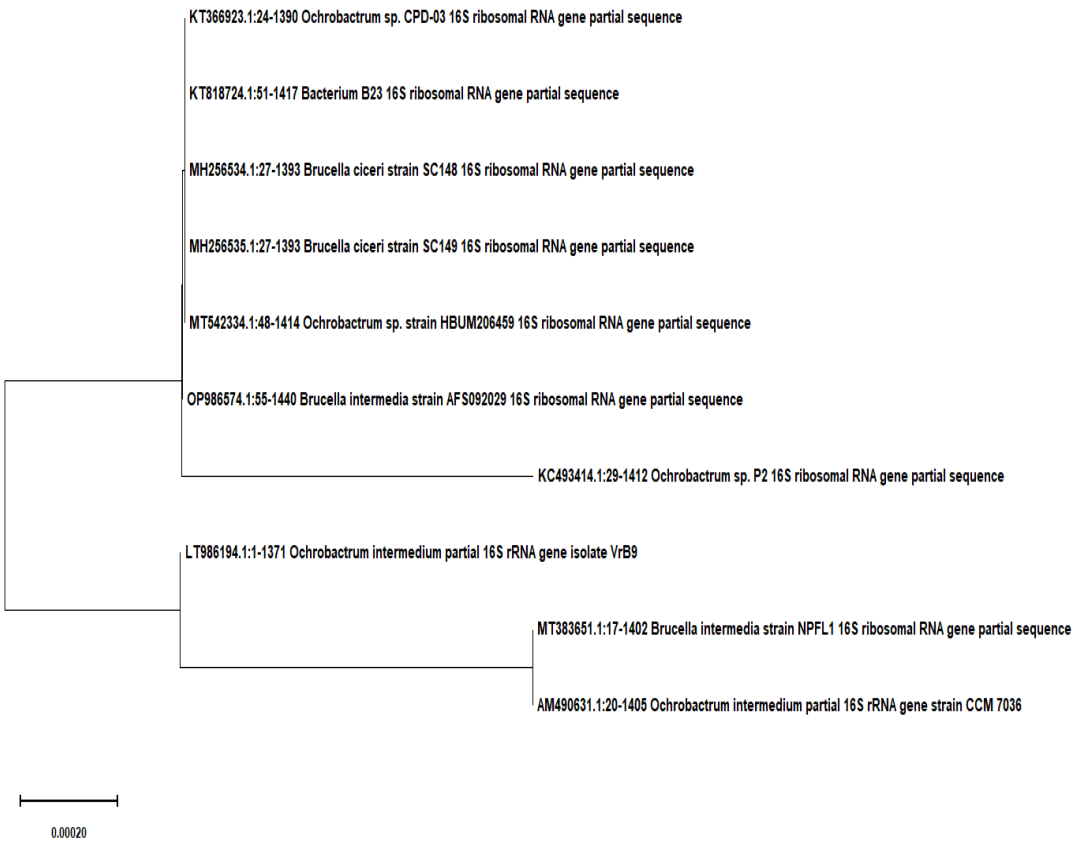


Fig. (A-4.6) Phylogenetic tree of potential bacterial species *Ochrobactrum intermedium* VrB9 after the characterization the 16S rRNA technique

Appendix 4 (b)

Table 4 (A)

Bacterial strain	% removal
S1	56±1.23
S2	45±2.32
S1+S2	72±2.85

S1: *Serratia marcescens strain* HL 1

S2: *Ochrobactrum intermedium* VrB9

S1+S2: *Serratia marcescens strain* HL 1 + *Ochrobactrum intermedium* VrB9

Appendix 4 (c)

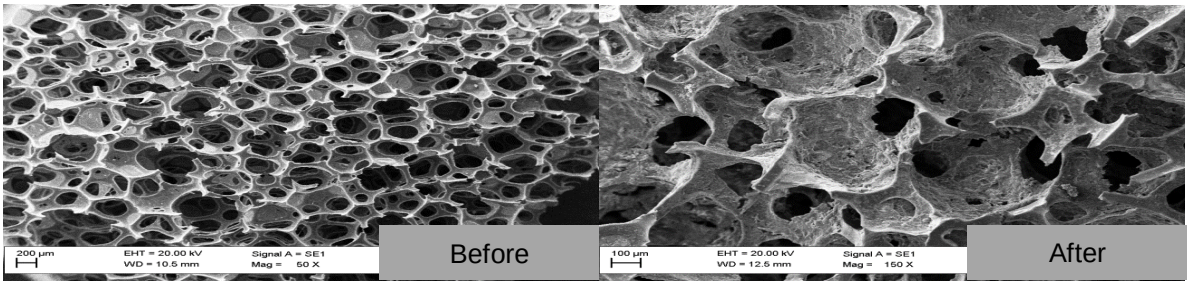


Fig. (A-4.7) SEM analysis of carrier before (0th day) and after formation (15th day) of biofilm

Appendix 4 (d)

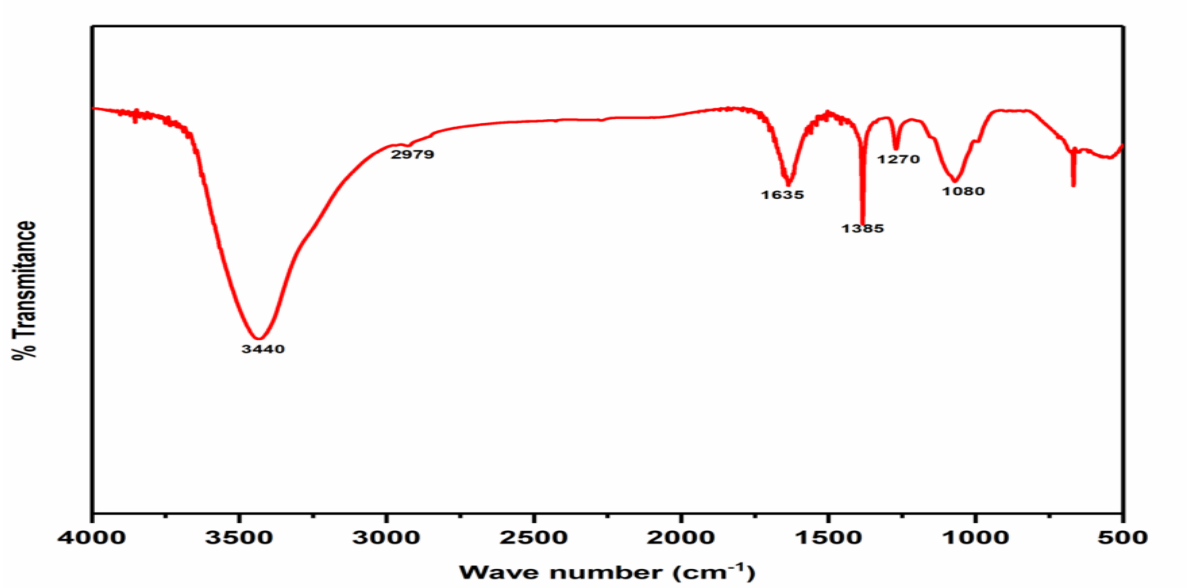
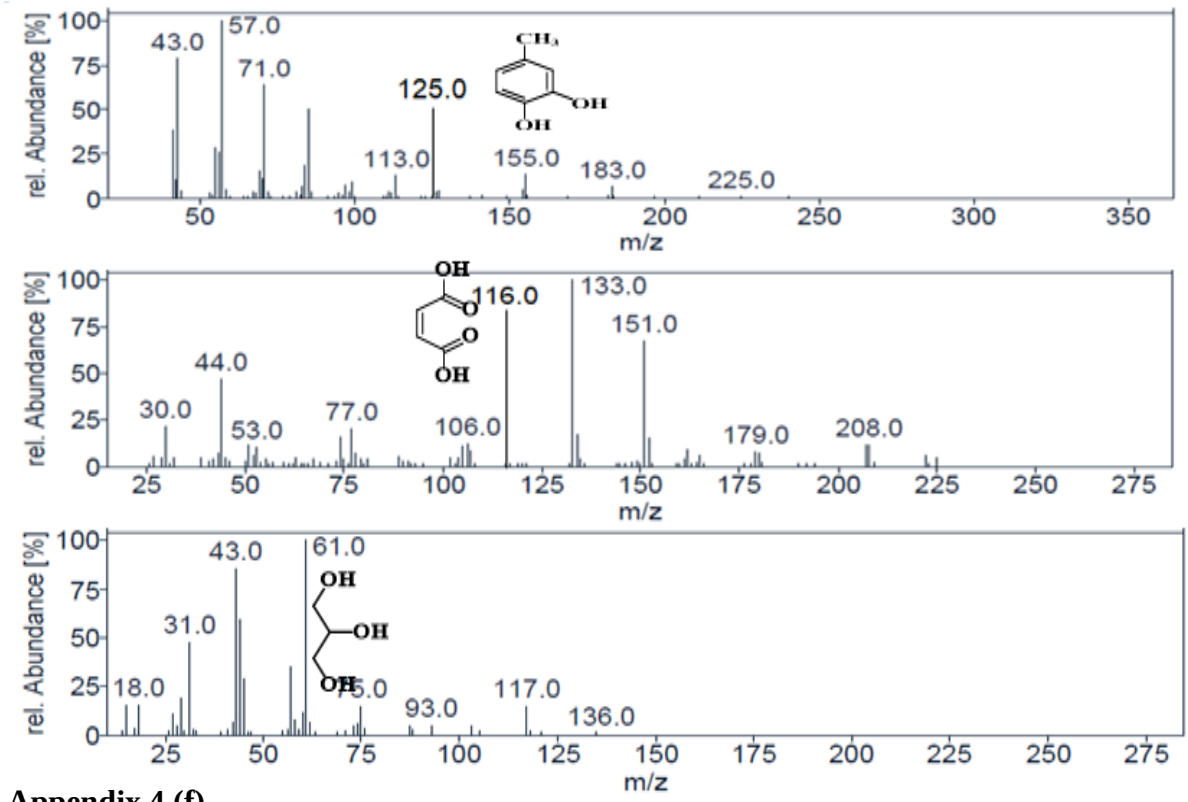


Fig. (A-4.8) FTIR spectra of biodegraded *p*-cresol

Appendix 4 (e)



Appendix 4 (f)

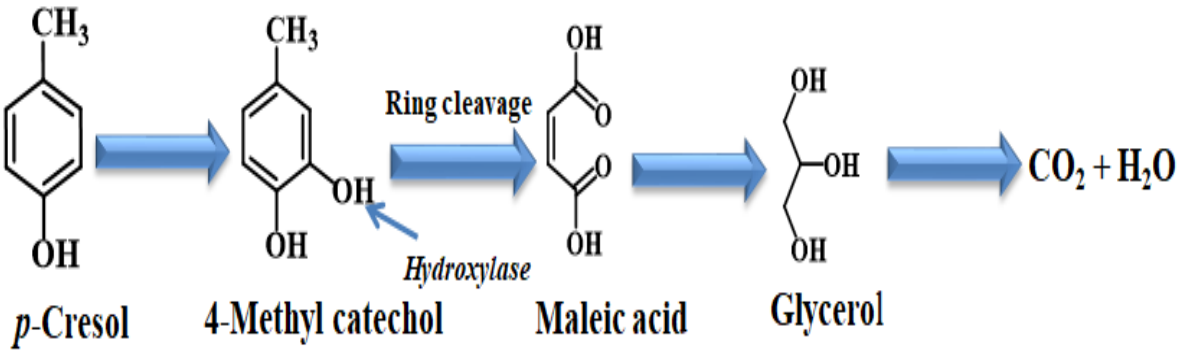


Fig. (A-4.9) Proposed metabolic path for the bacterial consortia to biodegraded *p*-cresol

Appendix 4 (g)

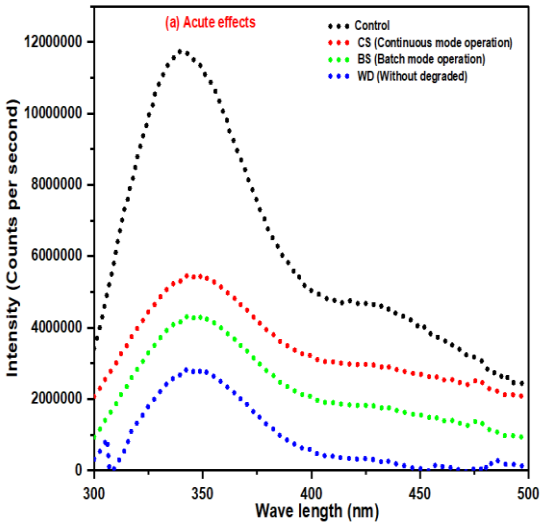


Fig. (A-4.10) Acute bioluminescence intensity of *p*-cresol (initial concentration 500 mgL^{-1}) control (distilled water), CS, BS and WD p-

Appendix 4 (h)

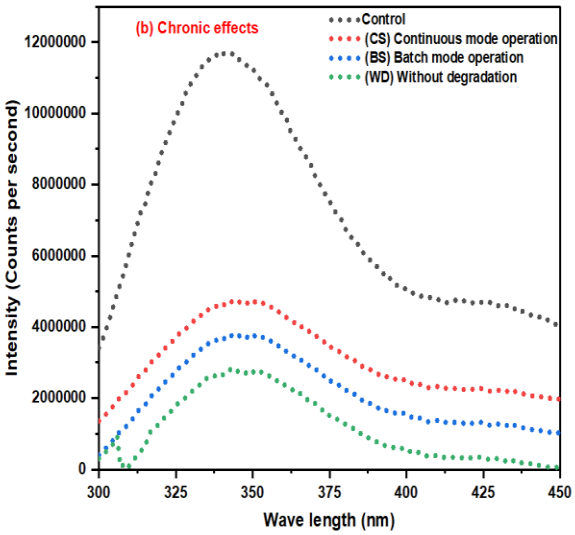


Fig. (A-4.11) bioluminescence intensity of p-cresol (initial concentration 500 mgL^{-1}) control (distilled water), CS, BS and WD *p*-cresol

Appendix 4 (i)

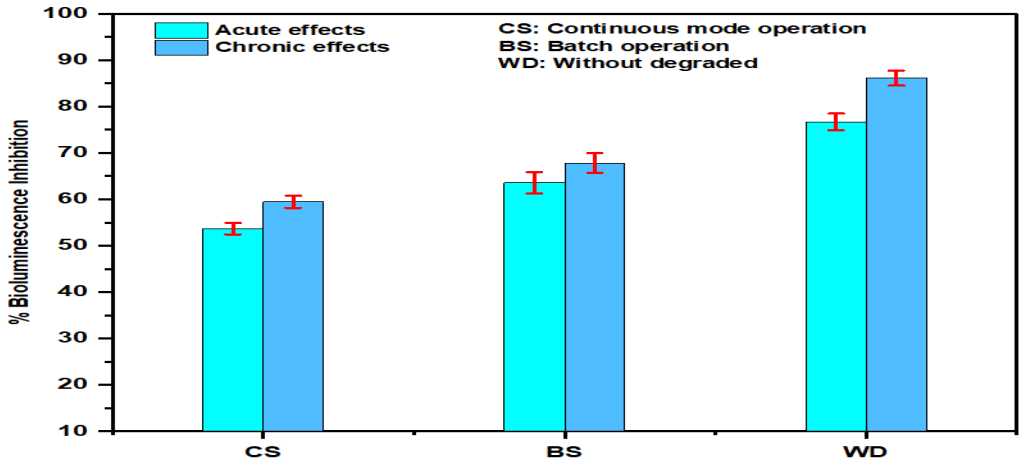


Fig. (A-4.12) Acute and chronic % bioluminescence inhibition of *p*-cresol (initial concentration 500 mgL^{-1}) CS, BS and WD *p*-cresol

Appendix 5 (a)

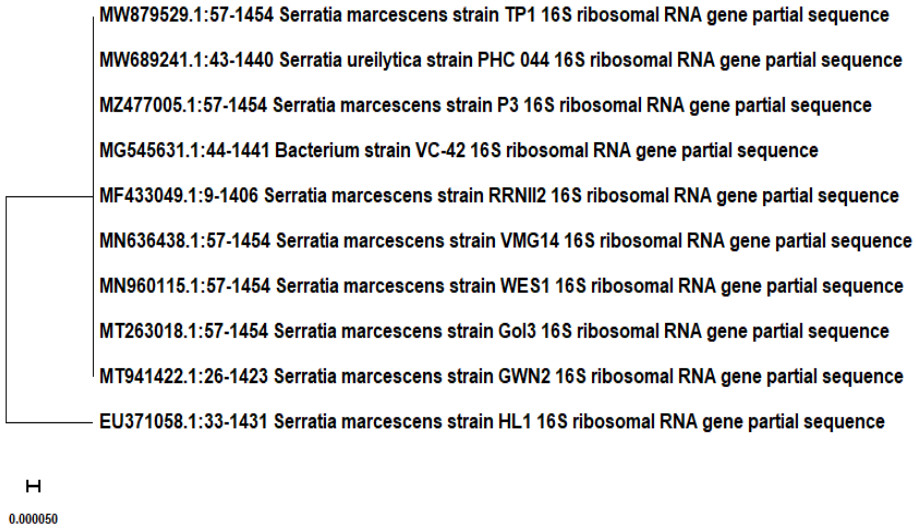


Fig. (A-5.1) Phylogenetic tree of potential bacterial species *Serratia marcescens* strain HL 1 after the characterization of the 16S rRNA technique

Appendix 5 (b)

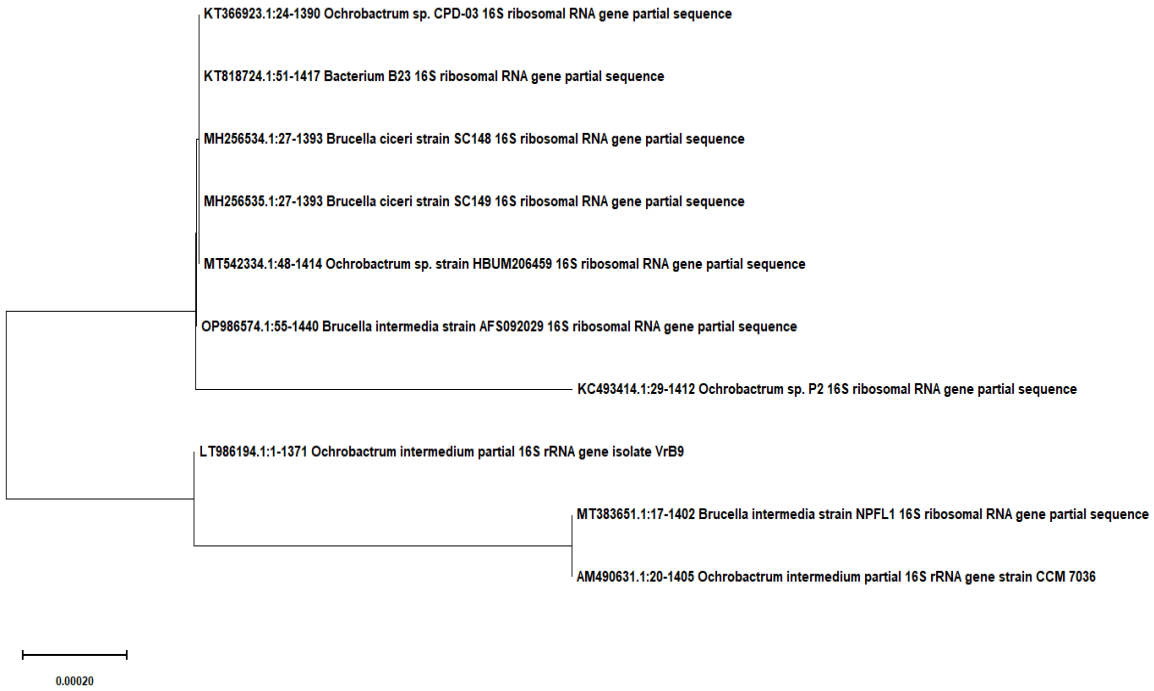


Fig. (A-5.2) Phylogenetic tree of potential bacterial species *Ochrobactrum intermedium* VrB9 after the characterization the 16S rRNA technique

Appendix 5 (c)

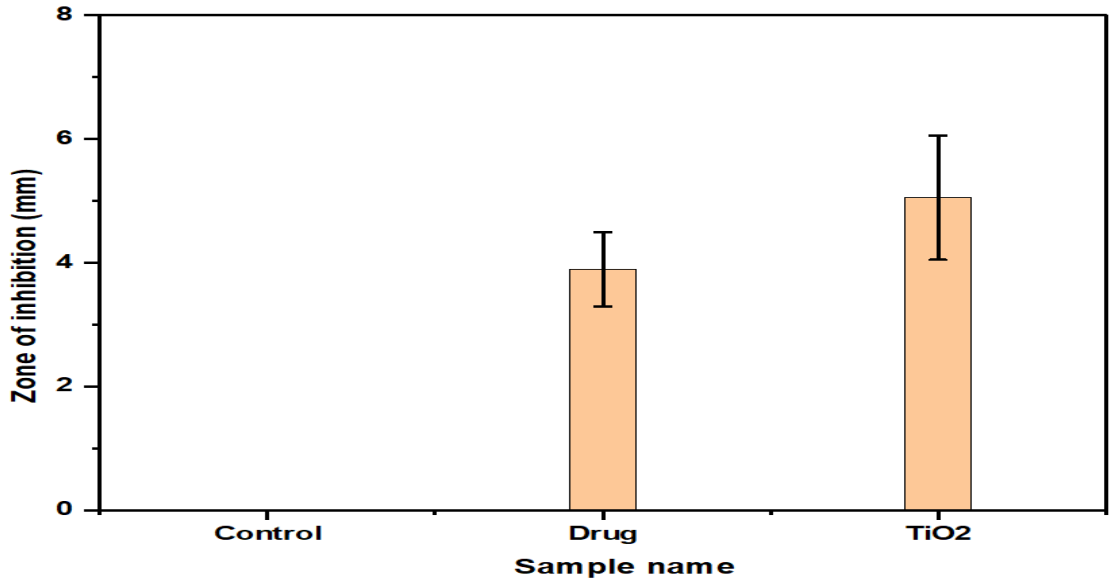


Fig. (A-5.3) Comparative study of inhibitory action of TiO_2 nanoparticles corresponding to gram positive (S. aureus) and gram-negative bacteria (*E. coli*)

Appendix 5 (d)

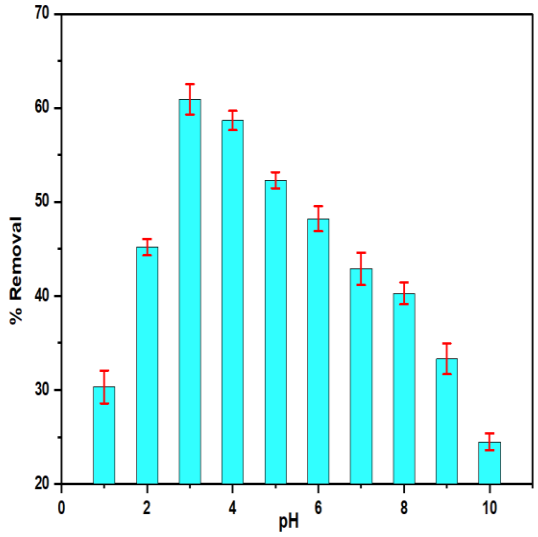


Fig. (A-5.4) Effect of pH on photocatalytic degradation of *p*-cresol (concentration: 100 mg L^{-1}; Catalyst dose: 0.5g L^{-1}, irradiation time 300 min

Appendix 5 (e)

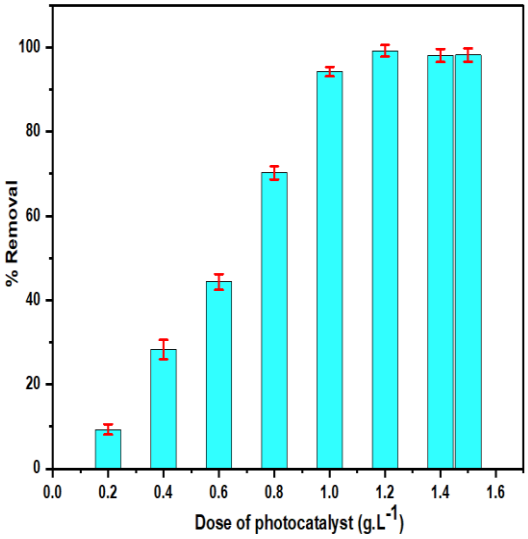


Fig. (A-5.5) Effect of dose of photocatalytic degradation of *p*-cresol (concentration: 100 mg L^{-1}; pH: 7, irradiation time 300 min)

Appendix 5 (f)

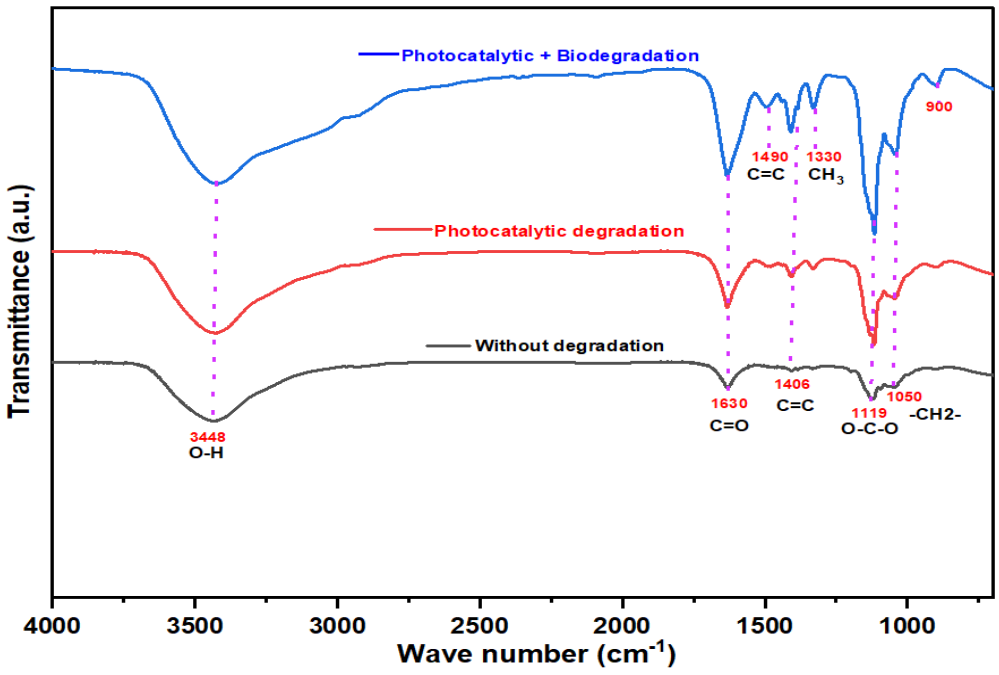


Fig. (A-5.6) FTIR spectra of *p*-cresol solution

Appendix 5 (g)

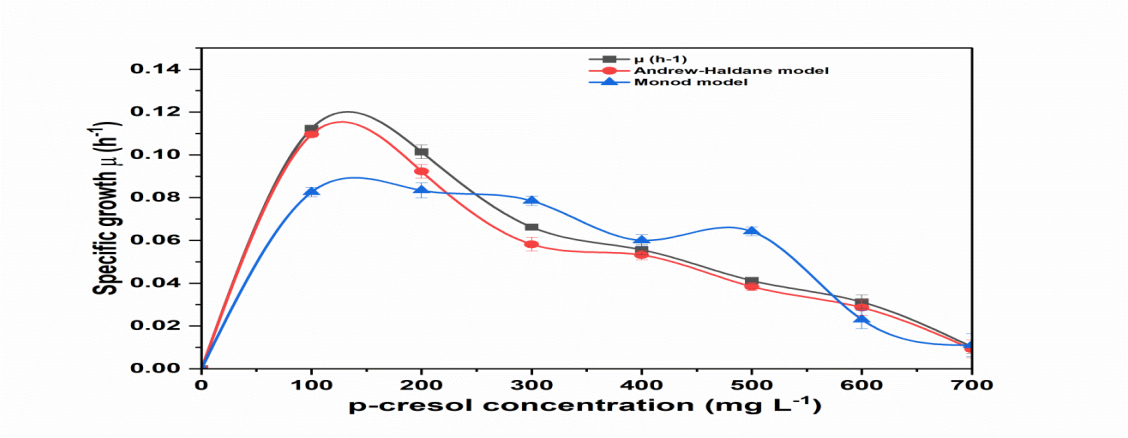


Fig. (A-5.7) Comparative study of experimental value with different Growth inhibition kinetic model

Appendix 6 (a)

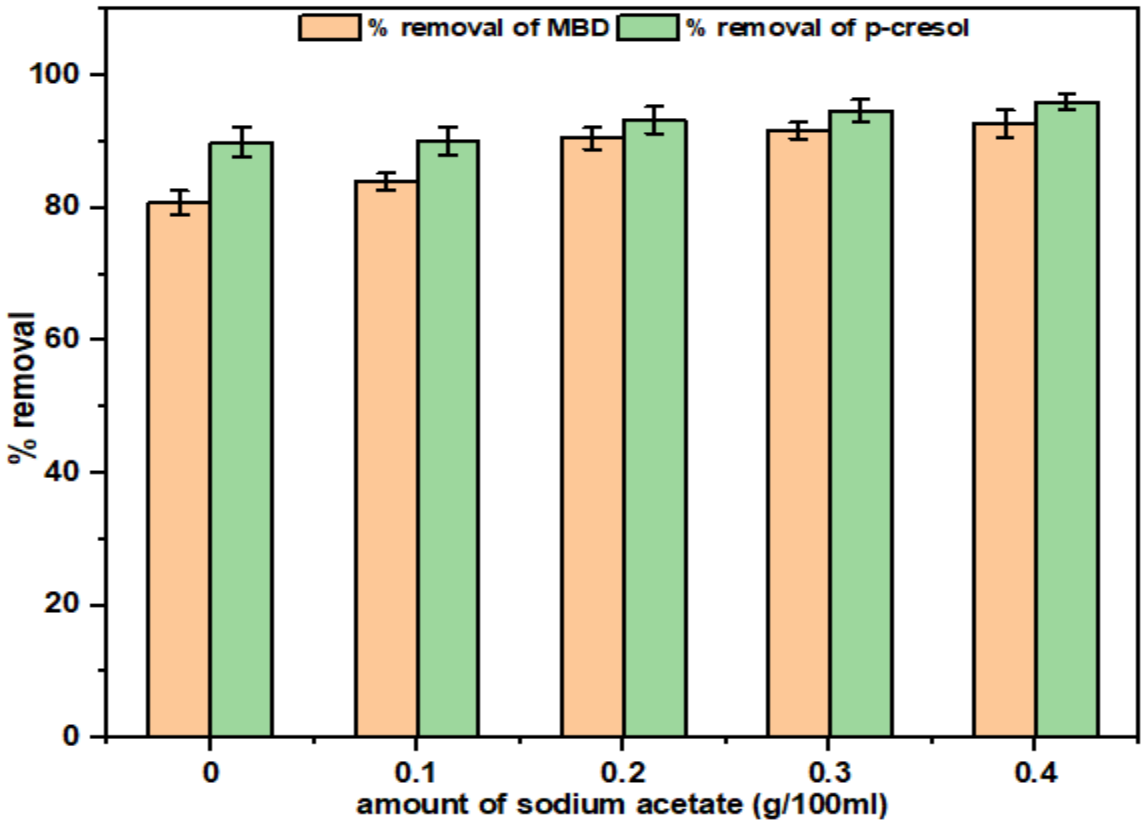


Fig. (A-6.1) Effect of Sodium acetate on simultaneous % removal of *p*-cresol and methylene blue dye

List of Publications &

Conferences/Workshops Attended

1. **Jaiswal, V.K**., Maurya, K.L., Sonwani, R.K., Singh, R.S., 2023. Biodegradation of p-cresol by Serratia marcescens strain HL 1 in batch system: Process optimization, growth kinetic study, phytotoxicity and chlorophyll assessment. **Bioresour. Technol. Reports 22**, 101426. https://doi.org/10.1016/j.biteb.2023.101426
2. **Jaiswal, V.K.,** Sonwani, R.K., Singh, R.S., 2023. Construction and performance assessment of Recirculating packed bed biofilm reactor (RPBBR) for effective biodegradation of p-cresol from wastewater. **Bioresour. Technol.** 384, 129372. https://doi.org/10.1016/j.biortech.2023.129372
3. **Jaiswal, V.K.,** Dutta, A., Verma, V., Singh, R.S., 2023. Bioresource Technology Degradation of p-cresol in the presence of UV light driven in an integrated system containing photocatalytic and packed bed biofilm reactor. **Bioresour. Technol.** 387, 129706. https://doi.org/10.1016/j.biortech.2023.129706
4. **Jaiswal, V.K.,** Sonwani, R.K., Singh, R.S., 2023. Assessment of enhanced p-cresol biodegradation by encapsulating pre-immobilised Serratia marcescens strain HL 1 on tea waste biochar into polyvinyl alcohol / sodium alginate matrix. **Biochem. Eng. J.** 199, 109046. https://doi.org/10.1016/j.bej.2023.109046
5. **Jaiswal, V.K.,** Sonwani, R.K., Singh, R.S., 2024. Journal of Water Process Engineering Simultaneous removal of p -cresol and methylene blue dye through upward-flow packed bed biofilm reactor (UFPBBR): Kinetics , phytotoxicity and bacterial toxicity assessment. J. Water Process Eng. 58, 104868. https://doi.org/10.1016/j.jwpe.2024.104868
6. **Jaiswal, V.K.,** Gupta, A.D., Kushwaha, R., Kumar, R., Singh, K., Singh, H., Mohan, D., Singh, R.S., 2025. Arsenic removal from water using an acid-modified biochar. J Mol Struct 1324, 140904.https://doi.org/10.1016/j.molstruc.2024.140904
7. **Jaiswal, V.K**., Gupta, A.D., Sonwani, R.K., Giri, B.S., Singh, R.S., 2024. Enhanced biodegradation of 2, 4-dichlorophenol in packed bed biofilm reactor by impregnation of polyurethane foam with Fe3O4 nanoparticles: Bio-kinetics, process optimization, performance evaluation and toxicity assessment. Bioresour Technol 406. https://doi.org/10.1016/j.biortech.2024.131085

- International Conference on Biotechnology for Sustainable Bioresources and Bioeconomy (BSBB-2022).
- National conference on Environmental and Industrial Biotechnology (NCEIB-2022)
- Training Programme on Wastewater Characterization, Treatment and Reuse (WCTR - 2023)
- International Conference on Technologies and Innovations for Sustainable Development (TISD-2023)
- International Sustainability Conference On Health, Safety, Fire And Environmental Advances (HSFEA-2023)
- International conference on Advance and Innovation in Biotechnology for Sustainable Bioresource and Bioeconomy (AI-BSBB -2023)
- An International Conference on Energy Transition: Challenges and Opportunity (IICHE-CHEMCON-2023)