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BIODETERIORATION AND SOME CHANGES IN PHYSICAL PROPERTIES OF OIL EMULSION BY AEROBIC BACTERIA ISOLATED FROM USED ONES

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Abstract

A thirty four isolates of aerobic bacteria diagnosed with the aid of morphological and biochemical properties belonged to fourteen different genera were isolated from various used oil emulsions , of these , twenty six were gram negative and the others were gram positive , only twenty isolate grow and gave significant growth when tested in Bushnell & Haas medium with 4% oil emulsion as a sole source of carbon and energy. The influence of eight isolates representing those bacteria which could utilize the emulsion on its original physical properties and the biodeterioration activity of these strains were studied indicating marked deterioration of oil emulsion with various rates among them , in order to gain some insight into functional role of detected populations , we correlate the MWF physical changes and potential activity of the detected bacterial isolates .

Keywords ; Biodeterioration , Physical changes , Oil emulsion , Colour index , Electrical conductivity . Aerobic bacteria .

References

- 1)Brinksmeier E., D.Meyer, A.G.Huesmann-Cordes and C.Herrmann (2015) . Metalworking fluids – Mechanisms and performance . CIRP Annals. Manufact. Technol., 64 : 605 – 628 .
 - 2)Natalia A.Y., Valentina, P.M. and Dmitry, V.Z. (2007) . Biodeterioration of crude oil and oil derived products ; a review. Rev. Environ. Sci. Biotechnol. 6 (4) : 315-337.
 - 3)Perkins S.D., L.T. Angenent (2010) . Potential pathogenic bacteria in metalworking fluids and aerosols from a machining facility. FEMS Microbiol. Ecol., 74 : 643 – 654.
 - 4)Ratul S., R.S. Donofrio (2012) The microbiology of metalworking fluids . Appl. Microbiol. Biotechnol. 94 (5) : 1119-1130.
 - 5)Holt J.G., N.R. KRIEG (1994) . Bergeys Manual of determinative Bacteriology (9th ed.) . ed:
- R.E. Buchanan, N.E. Gibbons. Williams and Wilkins Company , Baltimore .**
- 6)Budzinski H., N. Raymond and T. Nadalig (1998) . Aerobic biodegradation of alkylated aromatic hydrocarbon by a bacterial community . Org. Geochem. 28 (5) : 337 – 348
 - 7)ASTM Committed D2 on petroleum products lubricants (1974) . Demulsification number ASTM 01401 . In : ASTM standards on petroleum products lubricants. American Soc. For testing materials : pp:101 - 103 .
 - 8)Chaineau C.H., J. Morel, J. Dupont and E. Bury (1999) . Comparison of the fuel oil biodegradation potential of hydrocarbon assimilating microorganisms. Sci. total Environ., 227 (2-3) : 237 – 247 .
 - 9)Jonathan, D.V.H., J. A. Odumeru and O. P. Ward (2000) . Community dynamics of a mixed bacterial culture growing on petroleum hydrocarbons in batch culture. Canadian J. Microbiol., 46 (5) 441- 450 .
 - 10) Passman F.J. (2004) . Microbial problems in metalworking fluids. Tribol.& Lubrication Technol., 60 : 24 – 27.
 - 11) Muthuswamy S., A.R.Binupriya and S.H.Baik (2008) . Biodegradation of crude oil by individual bacterial strains and a mixed bacterial consortium isolated from hydrocarbon contaminated areas. J. clean-soil air water. 36(1) : 92-96.
 - 12) Christopher J.V., A. S.W. Ndrew, A. K.L. Ndrew, and P.T. Ian (2003) . Bacterial community structure and function in a metal working fluid. Environ. Microbiol., 5 (6) : 453-461 .
 - 13) Ajay S., J. Van Hamme (2003) . Accelerated biodegradation of petroleum hydrocarbon waste . J. Indust. Microbiol. 30(5) : 260-270 .

- 14) Nalina N., O.P. Ward (2002) . De-emulsification of petroleum oil emulsion by a mixed bacterial culture. *Process biochem.* 37(10) : 1135-1141 .
- 15) Boszczyk M.H., A. Zabost and D. Wolicka (2006) . Effectiveness of biodegradation of petroleum products by mixed bacterial populations in liquid medium at different pH values. *Pol. J. Microbiol.*, 55(1) : 69 -73.
- 16) Veillette M., P.S. Thorne and C. Duchaine (2004) . Six month tracking of microbial growth in a metalworking fluid after system cleaning and recharging. *Ann. Occup. Hyg.* 48(6) : 541 – 546 .
- 17) Theaker D., I. Thompson (2010) The industrial consequences of microbial deterioration of MWFs . In; Timmis K.N.(eds) *Handbook of hydrocarbon and lipid microbiology* . Springer, Berlin, Heidelberg.
- 18) Bento F.M., G.E.Englert and C.C.Gaylarde(2004) . Influence of aqueous phase on electrochemical bio corrosion tests in diesel/water systems. *Materials and Corrosion.* 55(8) : 577- 585 .
- 19) Gilbert Y., M. Veillette and C. Duchaine (2010) . Metalworking fluids biodiversity characterization . *J. Applied microbial.* 108(2) :437-449.
- 20) Rao D.N., R. R. Srikant and C. S. Rao (2007) . Influence of emulsifier content on properties and durability of cutting fluids .*J. Braz. Soc. Mech. Sci. & Eng.*,29 (4) : 396-400 .
- 21) Angel C., J. Coca (2007) . Interfacial properties of oil-in-water emulsions designed to be used as metalworking fluids. *Colloids and Surfaces* , 305(1-3) : 112-119 .
- 22) Ladders N., P.Kampfer (2015) . A combined cultivation and cultivation-independent approach shows high bacterial diversity in water-miscible MWFs. *Syst . Appl. Microbiol.*, 35(4): 246 – 252 .