

**STUDY OF CERAMIC MEMBRANE FLUX DECLINE RATIO AND FLUX
RECOVERY RATIO IN BIODIESEL PURIFICATION**

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgment is made in the thesis.



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ABSTRACT

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The Purpose of this research is to increase the Flux Recovery Ratio (FRR) and to decrease the Flux Decline Ratio (FRR) of the ceramic membrane, alumina-kaolin membrane that has been manufactured by Maharani (2022) and alumina commercial membrane that are used to separate biodiesel-glycerol feed, that will permeate the biodiesel from its pores while retaining the glycerol due to the particle size difference, but as separation goes by, the ceramic membrane permeate will decrease due to the retentate sitting on the membrane surface, causing a potential membrane polarization fouling and irreversible fouling. to increase the FRR of the ceramic membrane, after the separation of biodiesel-glycerol was done, the ceramic membrane was cleaned by several cleaning agents that potentially can increase the FRR, through this research the benzalkonium chloride shows capability to increase FRR of alumina-kaolin (98.17%) and alumina commercial (62.28%) membrane and in order to decrease the FDR of the membrane, with the methodology that has been done by Pagiliero et al (2020), the ceramic membrane is reacted with trichloromethylsilanes to modify the ceramic membrane to hydrophobic. and thus, the FDR of alumina-kaolin, with biodiesel-glycerol 1000 ppm, from 8.537% to 4.965%, biodiesel-glycerol 10000 ppm, from 18.293% to 11.348% and alumina commercial, with biodiesel-glycerol 1000 ppm, from 71.98% to 35.05% were decrease. Analysis with FTIR, to detect the presence of the silane coupling in the membrane and calculate glycerol concentration in permeate by using the methodology been developed by Bondioli et al (2004).

Keywords: Flux Decline Ratio, Flux Recovery Ratio, ceramic membrane, benzalkonium chloride, trichloromethylsilanes, FTIR, glycerol concentration



DEDICATION

I dedicate this work to myself and those who have always encouraged me to constantly push, to overcome difficulties, and to never abandon throughout my entire educational journey: my family, friends, college friends, and the future of science and technology in Indonesia.



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