

**RESEARCH PROJECT**

**METAL-ORGANIC FRAMEWORK AS**

**A DRUG CARRIER OF FUROSEMIDE**



**Submitted by**

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**SURABAYA**

**2019**

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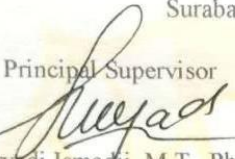
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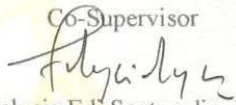
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Surabaya, June 12, 2019

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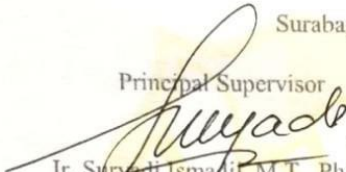
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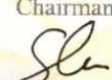
  
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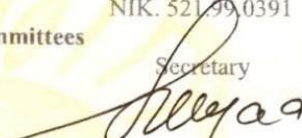
  
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## PREFACE

Authors give thanks to the Almighty God for all His blessings and mercy, so the Thesis entitled " Metal-Organic Framework as a Drug Carrier of Furosemide" can be completed on time. This thesis is one of the requirements for obtained a Bachelor of Engineering degree in the Chemical Engineering Department, Faculty of Engineering, Widya Mandala Catholic University Surabaya.

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2. Felycia Edi Soetaredjo, Ph.D., as Co-Supervisor, who has given lots of guidance and direction;
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Finally, the authors hope that this thesis can be useful for development in science and technology in the future.

Surabaya, June 12, 2019

Author



## ABSTRACT

Recently, pharmaceutical industries have developed more than 40% NCE (New Chemical Entities) to satisfy the needs of rapid treatment toward various diseases. Nevertheless, majority of those developments have several problems for instance low solubility and/or low permeability thus a suitable delivery system is required. Furosemide is a loop diuretic drug with those several problems. To the best of our knowledge, utilizing nanoparticle with tunable porosity such as Metal-Organic Framework (MOF) as drug delivery of Furosemide has yet to be found.

Synthesis of Metal-Organic Framework (MOF) known as MIL-100(Fe) was conducted via non-solvothermal method at room temperature under stirring condition using  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ ,  $\text{H}_3\text{BTC}$ , and  $\text{NaOH}$  as the raw materials. Several experiments were conducted to observe the synthesis, loading, and release behaviors of Furosemide using MIL-100(Fe) as drug carrier. From the results obtained, the optimum molar ratio of  $\text{NaOH}$  added in the synthesis of MIL-100(Fe) was found to be  $X=3$ . The effect of adsorbent dose exhibits a decrease number in the value of  $q_e$  and  $q_t$  as the mass of adsorbent increases, vice versa. The adsorption kinetic could be represented by the pseudo-first-order model, while the adsorption isotherm fitted well with Langmuir isotherm model. The release of Furosemide from MIL-100(Fe) in PBS at pH 5.8 and 7.4 fitted well with the first-order kinetic and Korsmeyer-Peppas model, respectively, which demonstrated a sustainable release of the drug.

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