UNIVERSITI TEKNOLOGI MARA

EVALUATION OF POLYETHERSULFONE- BASED FILTRATION PERFORMANCE WITH THE PRESENCE OF ANTIFOAM AGENT

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ABSTRACT

The performance of polyethersulfone membrane filtration was analyzed with the presence of silicon based antifoam. The purpose of this experiment to determine the loading capacity of filtration process and the effect of antifoam agent on Polyethersulfone (PES)- based filter membrane. In this experiment, Cobetter Polyethersulfone membrane and Hyclon silicon antifoam solution have been used. PES is usually used for culture media sterilization, life science and microbiology fluid applications, clinical, and general filtration. The filtration was conducted using dead end filtration mode. Different concentration of silicon based antifoam agent will be added to the process filtration within the range from low to high concentration. The filtration processes were conducted with the concentration of the silicon solution at 0% v/v, 0.1% v/v, 0.5% v/v and 1.0 % v/v with two different speed which were 25ml/min and 50 ml/min. Performance of the filter membrane were evaluated. Flux rate behavior of the membrane with addition of different concentration of silicon based antifoam agent throughout the filtration process time were recorded. Flux decline in membrane filtration is a result of the increase in the membrane resistance due the membrane pore blockage and the formation of a cake layer on the membrane surface. The analysis also conducted on resistance and capacity of the membrane filter from the pressure exerted throughout the filtration process.

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CHAPTER ONE:
INTRODUCTION

In this chapter, there will be briefly explanation about the evaluation of polyethersulfone-based filtration performance with the presence of antifoam agent. The polysulfone- based filter used in this project is cellulose acetate membrane and the antifoam used is silicon emulsion. The evaluation will be focused on the performance of the polyethersulfone membrane filtration when the media that contain biomass with presence of antifoam in varies concentration are filtrated.

1.1 RESEARCH BACKGROUND

Filtration is important to the efficient production of biopharmaceuticals. In biopharmaceuticals, filters are used for clarification, prefiltration, removing particles and reducing or removing bacterial contamination from buffer solution during buffer preparation. Clarification and prefiltration usually are proposed during the upstream processing to control smaller particles suspended in the stream that may cause a haze (Pabby, Rizvi, & Requena, 2015). Besides, the clarification also required to remove both smaller particles and larger microorganisms to protect more sensitive and expensive filter membranes that used in downstream processing. Filters in downstream will be focused more in removing particles and removing whatever bacteria present in the product before final packaging and also to protect the intermediate process from interrupting by the bacteria contamination (Sutherland & Chase, 2011).

Particles removal/ clarification are the important aspect to ensure the efficiency operation of downstream processes and to control the quality of the product. However, the improper clarification of the particle or bacteria can result the interference to the operation by causing the filter/ membrane fouling. Membrane fouling by biological foulants, such as proteins and bacteria has been major problem on filtration as a separation and purification system (Prasad & Prasad, 2010). Membrane fouling can be influenced by several factors,