UNIVERSITI TEKNOLOGI MARA

EVALUATION OF BUFFER STABILITY FOR THE PRODUCTION OF SMALL MOLECULES

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ABSTRACT

There are many types of buffering agent that can be used in the process line of biopharmaceutical industry. The most common buffering agent used in the biopharmaceutical industry mainly in the production of human recombinant insulin are ammonium acetate buffer, glycine buffer, potassium dihydrogen phosphate buffer, sodium acetate buffer, and tris(hydromethyl)aminomethane buffer solutions. These buffering agents are responsible to resist the pH changes throughout the production processes according to their compatibility towards the processes. The purposes of this research are to evaluate the stability of buffer solutions for a small molecules production mainly in the production of insulin and to propose the planning and management of the buffers uses and its storage. The research included the preparation of the buffer solutions, filtration of the buffer solutions, and the analysis of the buffer stabilities were based on the appearance changes, pH changes, and determination of the buffering capacities for each of the buffer solution. All the buffer solutions were stored at vary condition which are refrigerated and room temperature conditions. The buffering capacity for the ammonium acetate buffer is high in the room temperature condition. The glycine buffer rich in the buffering capacity when stored at the refrigerated condition. For the potassium dihydrogen phosphate, the buffering capacity is better in the room temperature. The buffering capacities for tris(hydromethyl)aminomethane and the sodium acetate buffer shows good buffering capacity at the room temperature respectively.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Buffering agent is widely used in producing a small molecule product especially in biopharmaceutical industry. The presence of buffering agent in a process line can help to resist the changes in pH upon the addition of limited quantity of acid or base. The existence of buffer in a solution also help to modify the solubility, color, stability, and the activity of a products, as well as the patient comfort. The buffering agent that is used in biopharmaceutical products are difference for each process according to the compatibility of the processes. According to senior scientific manager at *Biocon Research Limited*, the estimation of buffer volume used per year exceeding 2000 kL. The huge amount of buffer used in the biopharmaceutical industry can cause negative impact towards the buffer stability when there are no appropriate planning and management of the buffer solutions. Thus, this research is to evaluate the stability of the buffering agent in biopharmaceutical industry.

There are many types of buffering agent that can be used in the process line of biopharmaceutical industry. The most common buffering agent used in the biopharmaceutical industry mainly in the production of insulin are ammonium acetate buffer, glycine buffer, potassium dihydrogen phosphate buffer, sodium acetate buffer, and tris(hydromethyl)aminomethane buffer solutions. These buffering agents are responsible to resist the pH changes throughout the production processes according to their compatibility towards the processes. However, the presence of biological and particle contaminants in the buffer also can give impact towards the purity of final products. Therefore, the filtration of buffer is introduced in order to reduce or eliminate any contaminants that exists in the buffering agent.