UNIVERSITI TEKNOLOGI MARA

TPGS-1000 BASED PALM OIL NANOEMULSION: FEASIBILITY STUDIES, SYSTEM DESIGN, EMULSIFICATION, AND CHARACTERISATION

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ABSTRACT

The present study proposed D-α-tocopheryl polyethylene glycol 1000 succinate (TPGS-1000) as an emulsifying agent in optimizing a palm oil emulsion due to its various beneficial properties which lead to the preparation of an emulsion of high stability. TPGS 1000 is a water soluble derivatives of natural vitamin E which produced from the esterification of vitamin E succinate with polyethylene glycol. It is served as the excipient for overcoming multidrug resistance (MDR) and become an inhibitor of P-glycoprotein (P-gp) to increase an oral bioavailability of anticancer drugs. TPGS can act as anticancer agent, thus it can induce apoptosis and gain synergistic effect with other anticancer drugs. It is a non-ionic surfactant, having high HLB value of 13.2 and lower critical micelle concentration of 0.02% w/w, thus it is used in many areas such as drug delivery, solubility enhancement, wetting, emulsification as well as detergency. Palm oil is extracted from the mesocarp of the fruit of an oil palm species called Elaeis guineensis and it is widely used as cooking oil. In this study, palm oil which is a vegetable oil is used as an oil phase in the preparation of an emulsion, thus the study provide a promising approach to deliver an effective formulation containing palm oil to the right site of action. The TPGS-1000 based palm oil emulsion are studied for their stability in terms of physical appearance and the droplet size, zeta potential, dynamic mobility and debye length are measured and recorded during the storage period of the formulation.

CHAPTER ONE

INTRODUCTION

1.1 Background

D-α-tocopheryl polyethylene glycol 1000 succinate (TPGS-1000) is a non-ionic surfactant. It is a vitamin E based or derived surfactant. There have been lots of investigation on the surfactant because of its diversition used in many areas such as drug delivery, solubility enhancement, wetting, emulsification and detergency (Guo, Luo, Tan, Otieno, & Zhang, 2013).

TPGS displayed significant surface activity and notable effect on the lipid model membrane. It can solubilize a variety of water-soluble and water-insoluble compunds can be solubilized by TPGS. TPGS will form lamellar reverse micellar phase, hexagonal phase and normal micellar phase, as the water content increases (Mu & Feng, 2002). Other than that, TPGS is miscible with certain oils such as soybean oil and medium chain triglycerides, cosolvents such as propylene and polyethylene glycol as well miscible with other surfactants.