

UNIVERSITI TEKNOLOGI MARA

**SOLVODYNAMICS OF TPGS 1000 IN WATER: A
SONOCHEMICAL ANALYSIS**

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ABSTRACT

Three different series of TPGS 1000 solution have been prepared (series A, B, C) having different concentrations using direct dissolution of the surfactant in the water. The present study deals with the solute - solvent interaction and its solvodynamic parameters during the direct dissolution of the TPGS 1000 in water. The experimental parameters such as density and ultrasonic velocity have been measured to further evaluate the solvodynamics parameters. The solvodynamic parameters such as isentropic compressibility (K_s), apparent isentropic molar compressibility ($K_s\Phi$), internal pressure (π_i), relative association (R_a), acoustic impedance (Z), vanderwalls free length (b) and free volume (V_f) have been estimated so to understand the solute-solvent interactions within a system. It is observed that the density and the ultrasonic velocity values of the solution systems show an increase in trend with the increase in surfactant concentration. The observed trend can be ascribed to the fact of micellar dissociation. The estimated solvodynamic parameters, those complimented each other have been discussed in terms of the surfactant –solvent interactions which in turn support the contention of micellar dissociation.

CHAPTER 1

INTRODUCTION

1.1 Background

Surfactant is a compound which shows unique composition of interfacial and bulk properties (Hait & Moulik, 2002). Surfactants are generally known as cleaning agents due to its interesting surface active activity. As surface active agent, it helps in reducing the surface tension (Hiemenz & Rajagopalan, 1997). Surfactant has tendency to accumulate at the interface which is the boundary between two phases (immiscible liquid) (Vittal, Gomathi, & Kim, 2006).

Surfactants are also called amphiphiles, those are characterized by the presence of both hydrophilic (water attracting) and hydrophobic (water repelling) region within the same molecule's structure (Lin & Lai, 2011). Due to the difference in the structural feature of a surfactants based on hydrophilic region of the surfactant molecule, they are basically divided into 4 different groups (Vittal et al., 2006) such as non-ionic, cationic, anionic and amphoteric surfactants (Hiemenz & Rajagopalan, 1997).