UNIVERSITI TEKNOLOGI MARA

EFFECT OF ALCOHOLIC SOLVENTS ON UREA-BIURET MORPHOLOGY

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ABSTRACT

Nowadays, urea is a critical ware concoction utilized primarily in the compost and plastics businesses. It is by and large created by a high weight response amongst alkali and carbon dioxide amid which little amounts of the dimer disintegration item biuret are shaped. In many procedures a crystallization step is utilized to create the last item. The purpose of this research study is to evaluate the influence of alcoholic solvents on morphological growth of urea-biuret crystal and to assess the morphological characteristics of urea-biuret crystal by using optical microscope and analytical analysis. The unmodified and modified urea were analyzed by using optical microscope, DSC and FT-IR in order to study the morphological growth, thermal analysis and chemical composition respectively. From the morphology characterization by using optical microscope, it can be concluded that modified urea dissolved in ethanol with the addition of biuret at mole ratio (2:5) produced the best morphology of crystal compared in 2-propanol and iso-butanol. For thermal analysis by using DSC, it can be concluded that modified urea in ethanol that are first to form first small peak to reach its melting point but are not fully crystallized until the second peak that is more larger formed. This results can support the previous research that modified urea dissolved in ethanol has the higher solubility. Next for FT-IR analysis result, it can be concluded that IR graph of the unmodified and modified urea showed almost the same functional groups with little exception of some examples.

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

It is very important to control the evolution of crystal morphologies by understanding crystal growth from solution such as alcohol. According to Lovette et al (2008), crystals shape controls a wide variety of properties since the interaction of crystals with their environment occurs through their surface. This is particularly important not only in nano-technology, where shape–function relations play a key role, but also in pharmaceutical where changing the morphology of particles allows for instance for a better targeting of cancer cells (Salvalaglio et al., 2013). Morphology of crystal is one of the important key in determined the performance and quality of the crystal product. There are few parameters that influence the crystal growth such as the supersaturation level, type of solvents, temperature, pH, hydrodynamics, cooling rates, etc. Crystallization process is controlled by these parameters and may affect the polymorphism, size and shape of the crystals. Different phase of crystal will produced different growth rate.

Urea is a crucial commodity chemical used widely in the fertilizer and plastics industries. Generally, it is produced by a high pressure reaction between ammonia and carbon dioxide during which small quantities of the dimer decomposition product biuret are formed. In many processes a crystallization step is employed to produce the final product. Crystallization of urea in aqueous solution will produced needle long like shape under optical microscope (Davey et al., 1986). By Adding additive that will affect the shape of the crystals such as biuret, that is, a foreign molecule that selectively binds to the fast growing face of the urea crystal in water, the range of accessible habits broadens even more. In fact in water biuret leads to a drift in the a region towards cuboid crystals.