UNIVERSITI TEKNOLOGI MARA

EFFECT OF MILLING TIME IN PRODUCTION OF UREA COMPOUND BY BALL MILLING TECHNIQUE

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ABSTRACT

The study of the production of urea compound by ball milling technique gives the potential to solve the fertilizer problem. The aim of the paper was to investigate the optimum milling time in production of urea through ball milling techniques by varying the time taken for the tendency of urea to avoid become hygroscopic in order to generate quality urea fertilizer that will not cause hydrate formation in the presence of water that will make the mixture wet and sticky. Physical analysis showing that with prolonging the milling time, the mixture becoming from powder form to clumped**.** Through TGA, the influence of milling time and the content on the thermal stability of urea calcium phosphate has been investigated. The TGA analysis showing that weight loss increasing with increasing milling time up to 8 min, but showing weight loss starting from 10 min onwards. Weight loss showing the least at 2 min milling time. Through FTIR, the milling process of 2 minutes recorded moisture loss of 21.7% and 4.34 mg weight loss, while 4 minutes is at 24.01% with 4.80 mg, 6 minutes at 30.46% and 6.09 mg, 10 minutes is at 28.4% and 5.70 mg and 12 minutes at 25.28% and 5.06 mg of moisture loss and weight loss respectively for all of the samples that being milled. Through all the above characterizations of FTIR, XRD and TGA that has been made on milled urea calcium phosphate, optimum milling time in production of urea through ball milling techniques to avoid urea from becoming hygroscopic in order to generate quality urea fertilizer that will not cause hydrate formation in the presence of water that will make the mixture wet and sticky is at 2 min of milling. Physical analysis showing that with prolonging the milling time, the mixture becoming from powder form to clumped.

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CHAPTER ONE

INTRODUCTION

1.0 Research Background

Paddy and rice industry in Malaysia has dependably been given unique treatment based on the strategic importance of rice as a staple sustenance product (Nurul Nadia Ramli, 2012). In Malaysia, rice which is a staple food for the community and the industry is considered tactical, which always gets exceptional treatment from the government (M. A. Fatimah, 2007). In 2009, it gives the occupation to 172, 000 paddy ranchers in the nation, aside from being the fundamental wellspring of sustenance. Land usage for paddy creation is right now at 674, 928 hectares where 76 percent is Peninsular Malaysia while Sabah and Sarawak represented 18 percent and 6 percent of the aggregate hectareage separately.

Fertilizer production and consumption has increased in the past decade and there is sign that this will continue to grow and increase. Since the end of war, total production of phosphate fertilizers has already doubled (Bridger, 1954). Ever since the demand of fertilizer has been increased, the fertilizer production trends has rapidly changed since then as the competitiveness of producing fertilizers are tight. Several types of fertilizers are being used namely organic fertilizer and chemical fertilizer to expand the productivity of food crop in nation (Mohammed Massri, 2014)

In Malaysia, mineral fertilizers represent more than 90 percent of manures utilized by a wide range of cultivating frameworks in Malaysia. The main fertilizers are urea, ammonium sulphate, calcium ammonium nitrate, phosphate rock, super phosphates, ammonium phosphate, potassium chloride, potassium sulphate and NPK, NP and PK compound fertilizers (Tarnadis, 2017). There has been a comparing increment in manure use due to the rapid development in crop production, particularly of estate crops. Potassium fertilizers have demonstrated the biggest increment and exceptionally powerful for the yields.

The final production of urea fertilizer production operation is in either prilled or granular form. Both of the production form from urea melt requires the use of a large volume of cooling