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Judul : Pengaruh Temperatur Kalsinasi Terhadap Kinerja Desorpsi Pupuk Slow Release Silika Mesopori-Urea-Glutaraldehyd
Title : Effects of Calcination Temperature on Desorption Performance of Slow Release Silica Mesopori-Urea-Glutaraldehyde Fertilizer

ABSTRACT

Nitrogen is one of the most widely used fertilizers. However, due to the loss of large amounts of nitrogen during evaporation and washing, the utilization rate is only 30-50%. In the end, it leads to a drastic loss of fertilizer and environmental pollution. Slow-release fertilizers are used to slow down or even control the rate of release of fertilizer into the soil to better accommodate plant absorption and reduce nutrient loss for plants. The study produced a slow release fertilizer by synthesizing mesoporous silica with porous conductors of Cetyltrimethylammonium bromide (CTAB), urea fertilizers as fillers, and glutaraldehyde for retention. The study was also conducted with variations in calcination temperature to determine the influence of calcinating temperature on slow release capacity. Therefore, the objective of this study is to obtain the results of mesoporous silica synthesis with CTAB pores and variations of calcification temperature 350°C, 450°C, 550°C and 650°C on the slow release of nitrogen from each of the synthetic mesopori-urea-glutaraldehyde silica.

The research was conducted in five stages: silica gel synthesis, CTAB binding to silica Gel, Silica-CTAB coating with silica+CTAB, Mesopori-Urea-Glutaraldehyde Silica production, and nitrogen slow release testing. In the third phase, the samples are calcinated with temperature variations of 350°C, 450°C, 550°C and 650°C. The final phase is nitrogen slow-down testing that is carried out over time intervals of 0, 2, 4, 6, 8, and 10 days.

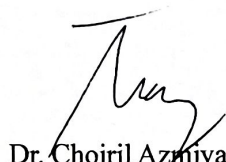
The results obtained from this study are mesoporous silica proven with the FTIR spectrum, which is the presence of asymmetric siloxane bending vibration (Si-O-Si) at a wave number of 1000-1200 cm^{-1} and symmetric siloxane stretching vibration (Si-O-Si) 782-793 cm^{-1} , and also silanol stretching vibration (Si-OH) 960 cm^{-1} . Calcination temperature variations affect the characteristics of mesoporous silica. The higher the calcination temperature, the smaller the surface area and pores. Test results of the slow release of nitrogen with calcination temperature variations released the lowest nitrogen concentration of 112.9 ppm obtained from the temperature variation of 650°C on the 6th day. The higher the calcification temperature, the slower the nitrogen becomes more efficient.

Keywords: Mesoporous silica, CTAB, Calcination, Desorption, Nitrogen

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