

**OPTIMIZE NITRIC ACID INJECTION PID CONTROL LOOP
IN AMMONIUM NITRATE - FINAL SCRUBBER SYSTEM TO REDUCE
ENVIRONMENTAL AND HUMAN RISK OF NH₃ AND HNO₃ FUME**

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

OPTIMIZE NITRIC ACID INJECTION PID CONTROL LOOP IN AMMONIUM NITRATE - FINAL SCRUBBER SYSTEM TO REDUCE ENVIRONMENTAL AND HUMAN RISK OF NH₃ AND HNO₃ FUME

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pH value in the Ammonium Nitrate (AN) manufacturing is one of the key aspects to control, since acidic condition is one of the catalysts that can lead to AN decomposition and explosion. Uncontrolled pH in AN manufacturing also can lead to various environment and human risk. This research purpose is to control pH in Ammonium Nitrate solution specifically in the Final Scrubber System using PID control to prevent risk on environment and human. Several setting using methods from Ziegler Nichols, Cohen-Coon, and Auto-Tune using Siemens PCS 7 DCS are implemented in this research. Throughout the research, it was found that the Final Scrubber System pH Control introduce a long dead time. Four from six PID setting successfully maintain the pH in the Final Scrubber System. The final PID setting that used in the system is from Cohen-Coon with PI only.

*Keywords: Ammonium Nitrate, pH Control, PID, PID Tuning, Auto Tune PID, Long
deadtime, Process Response Test, Siemens PCS 7*

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DEDICATION

I dedicate this research work for my both of my parents, late father and my mother,
my beautiful wife, my lovely daughter, and for my country Indonesia

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I have found my coursework throughout the Curriculum and Instruction program to be stimulating and thoughtful, providing me with the tools with which to explore both past and present ideas and issues.

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