



FACULTY OF ENGINEERING

DEPARTMENT OF MINING ENGINEERING

**PROJECT TITLE: "INVESTIGATING THE EFFECTIVENESS OF AMMONIUM
THIOSULFATE IN GOLD RECOVERY.**

CASE STUDY: TIIRA ASM

BY

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A final year project report submitted to the Department of Mining Engineering, Faculty of Engineering and Technology in partial fulfillment of the requirement for the award of the Bachelor of science in Mining Engineering of Busitema University.

ABSTRACT

With the increasing environmental pollution and health risks in communities within and around gold mining areas in Tiira, Uganda, there is a growing need to find safer gold extraction methods. The government of Uganda, along with NGOs like the National Environmental Management Authority (NEMA) and the World Health Organization (WHO), has identified cyanide and mercury as major pollutants in artisanal and small-scale gold mining (ASGM). In Tiira, most small-scale miners rely on mercury amalgamation, which releases toxic mercury into the air, water, and soil. This exposure has severe health effects, including damage to the nervous system, kidneys, liver, and immune system. Additionally, mercury use in gold recovery results in impurities in the final gold product.

This project investigates the effectiveness of ammonium thiosulfate (ATS) in gold recovery as a safer alternative to traditional methods. The study objectives are: to characterize the gold sample; to determine gold leaching efficiency of ammonium thiosulfate under varying conditions; and to optimize the operational parameters for maximum recovery.

Chapter One introduces the study, presenting the background of the problem, clear research objectives, the scope of the study, and the justification for exploring ATS as an alternative gold recovery method.

Chapter Two consists of the literature review, which examines previous research on gold extraction methods, comparing the efficiency, environmental impact, and feasibility of ATS leaching versus mercury amalgamation and cyanide leaching in small-scale mining. The chapter also highlights case studies where thiosulfate leaching has been successfully applied.

Chapter Three covers the methodology used in the research. This involved collecting and characterizing a gold ore sample from Tiira, conducting laboratory tests under varying pH, temperature, and ATS concentrations, and analyzing the effectiveness of ATS using both qualitative and quantitative techniques.

Chapter Four presents the results and discussions of all tests and experiments carried out. It includes a detailed analysis of the gold content in the sample, recovery efficiency under different conditions, and the optimization of parameters for improved leaching performance. The conclusion section summarizes the key findings, highlights the limitations and challenges

encountered during the research, and provides recommendations for improving the use of ATS in small-scale mining. The references section cites various articles, journals, and reports that contributed to this study.

DECLARATION

I BANYAHANA JUDE, BU/UP/2021/0462, declare to the best of my knowledge that the work presented in this project report is out of my effort and has not been published or submitted before to any university or higher institution of learning for the award of a bachelor of science in mining engineering.

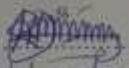
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APPROVAL

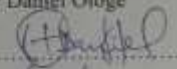
I **BANYAHANA JUDE**, submits this report of my final year project to the faculty of engineering in the department of mining engineering for examination with approval of my supervisor.

Mr. Kwikiriza Mathias

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Date: 14/05/2021

DEDICATION

This research is dedicated to my lovely parents and family for the efforts they have made towards my academic who have stood by me and always believed in me. May the almighty God bless you.

ACKNOWLEDEMENT.

First of all, I thank the almighty God for his protection and wisdom he granted to me throughout my education life.

Sincere appreciations to my supervisors Mr. Kwikiriza Mathias and Mr. Ologe Hector Daniel for their continuous effort towards my project report writing, may God keep you well.

I would also like to thank my parents and friends for their financial, emotional support during this period.

I would also like to appreciate my classmates at large for their guidance and cooperation throughout my report writing. May the Almighty God bless you and reward you all.

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LIST OF ABBREVIATIONS

ATS - ammonium thiosulfate

AAS- Atomic Absorption Spectroscopy

XRF- x-ray fluorescence

4.5 REFERENCES

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